

Additional Applied Science A Twenty First Century

General Certificate of Secondary Education **GCSE J632**

Report on the Units

June 2009

J632/MS/R/09

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

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Introduction from the Chief Examiner

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 discrimination 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 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 and only a minority would have benefited by sitting the other tier of the examination.

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 had a tendency to leave questions blank that they had difficulty answering. This 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. A good example of this is question 6b in the Life Care Foundation paper, A324/01.

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 Components taken in June 2009

Candidates should be familiar with standard procedures and how they are used. They form the basis for questions in several of the modules. In the work related portfolio the majority of the candidates are now competently completing six suitable standard procedures and carrying out a wide range of interesting research for the work related report. Most of the practical work seen for the suitability test showed appropriate work related links, with evidence that candidates are now appreciating the assessment needs for the suitability test.

It was pleasing to see that the majority of the procedures completed by the candidates were suitable and allowed access to all four available marks.

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.

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

General comments

The paper performed well although good responses to question 5b were very rare at this level. This was a question requiring candidates to relate the structure of alveoli to their function.

There was no evidence of any candidates having insufficient time to complete the paper and generally speaking the candidates were able to demonstrate a good understanding of triage and health care provision.

Comments on Individual Questions

1(a) This was a very accessible question and very few candidates failed to score three marks (although all three “wrong” responses were used occasionally).

1(b) Most candidates scored the mark by referring to “fitness” in some way or by referring to the idea of avoiding an exercise which might cause injury. However, weaker candidates strayed into assessing how “healthy” Gemma was and therefore forfeited the mark.

2(a) The concept of triage was well known in the majority of centres, even if it was not always well explained. Most candidates managed to indicate that the life threatening injuries would be treated more quickly and a sizeable number gave examples, such as a heart attack would be treated before a broken bone. However, weaker candidates totally missed the point and focussed on what emergency treatment was for. They glossed over ‘prioritised’ and stated that emergencies went to A and E.

2(b) The bulk of candidates identified all the tests correctly with a few weaker candidates scoring two for correctly linking broken leg and X-ray and the pregnant woman and the ultrasound scan.

3(a) There appeared to be a fair amount of confusion amongst candidates about the correct answer, but it was attempted by (almost) everyone.

3(b)(i) The analysis of the risks and benefits to Malik of his procedure were often poorly described. The concept that the procedure may have benefits for Malik was not hinted at in the question stem, so very few candidates went there. The concept of risk (heavily flagged in the stem) was often linked in to the transplant theme and elicited detailed accounts of the possibility of rejection or poor tissue matching instead of answering the question.

3(b)(ii) A small number of students gained all three marks, but the majority gained one mark for the idea of specialisation, either in terms of staff or equipment. A worrying minority were convinced that local hospitals were totally inadequate and either too dirty or had unqualified staff and therefore couldn’t carry out such procedures. A few candidates also confused private and NHS hospitals, stating that it was preferable to have the procedure carried out at the regional hospital because it was free whereas the local one charged.

4(a) This question was generally very well answered. The more able students were able to state RICE (or give at least two of the words e.g. ice, rest.....), whereas the less able were able to refer to either rest or light/gentle exercises.

4(b) Another question which was generally well answered, although there were a few candidates that left the entire question blank, denying them 4 ‘easily accessible’ marks. A small number of

Report on the Components taken in June 2009

students repeated the role 'physiotherapist' and therefore automatically lost 2 marks, whilst others referred to a 'fitness' instructor, which again is not strictly a health care worker.

5(a) This question produced some interesting answers which were very centre dependent. Virtually everyone attempted to complete the labels. Whilst the majority of students gained at least 2 marks, there was a full spread with students gaining 0, 1, 2, 3 and 4 marks. Rib and diaphragm were the more familiar structures, with the alveolus frequently confused with bronchiole.

5(b) This question was very poorly answered. A number of candidates left it blank and those attempting an answer clearly had no understanding of alveoli and gas exchange. Only a few, very able candidates, were able to pick up marks for blood flow or large surface area.

5(c)(i) Most candidates were able to access this mark and the question was generally well answered.

5(c)(ii) This question was generally well answered, producing a good spread of 0, 1 and 2 marks. Most students got the idea that asthma cannot be cured, and the more able were able to explain the idea that the medicine can only treat the symptoms/ open up the airways. A sizeable minority produced answers that reflected back to the previous question and suggested that he just hadn't found the right medication yet.

6(a) Many candidates correctly identified that the surgery to remove the healthy stomach was preventative – although a lot went on to indicate that this was the precursor for a stomach transplant, or that she would grow a new one (both of which were ignored). There were lots of candidates who “assumed” that Sandra was at future risk but did not say it in such a way as to add to the stem of the question. They simply repeated that Sandra had inherited the problem or some such. Answers which indicated that she was “at increased risk” or “likely” to suffer from it were very rare.

6(b) The staples of a “balanced or healthy diet” with long lists of good and bad foods were trotted out often scoring a consolation mark with “fruit & veg” and the like – with only the best answers taking any notice of the question context. Many assumed that she would be getting over a transplant – or more interestingly would grow another stomach – some majored on proteins, sometimes getting a mark as a result. Only the more able students could link the lack of a stomach with the idea that digestion would be restricted, so small amounts of easily digested food would be required.

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

General Comments

The paper provided a wide range of marks and most candidates were able to make some response to all questions. Fewer very weak candidates appeared, reflecting Centres targeting Higher Tier entry better this session. 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, however, vital that schools should emphasise the importance of clear handwriting and following the guidance about writing their answers in the space provided as scripts are scanned and marked on-line. Candidates should be encouraged to look at the number of marks available for each question and check that their answers contain at least that number of separate points.

Comments on Individual Questions

1) This was an overlap question with the Foundation paper. Part 1(a) often generated 3 of the 4 available marks with common errors being gullet/food tube for A and confusion between intercostal muscles and ribs for B. 1(b) was poorly answered in many centres and reflected a lack of understanding of the relationship between structure and function of the alveoli. Many candidates seemed unsure about the meaning of the term 'feature' and were unsure/unaware of how gas exchange takes place in the alveoli. Part (c)(i) was well answered and in (c)(ii) candidates needed to state that there is no cure for asthma rather than just restate the question 'the medication has not cured his asthma'.

2) In 2(a) most candidates correctly identified the ultrasound scan with the pregnant women and the faecal sample with the food poisoning but very few could distinguish correctly between the use of the MRI scan and the CT scan. 2(b) clearly demonstrated the need for candidates to check the mark allocation as very few gained a second mark, answers simply being 'not involving cutting open the body'. There are many medical uses for a PET scanner and candidates who attempted 2(c) often gained a mark. There were a significant number of blanks for this section suggesting candidates had not come across PET scanners in their studies.

3) Many candidates gained 1 mark in 3(a) but few went on to score a second mark. 3(b) was well answered. 3(c) has a total of 4 marks but candidates frequently only gave one advantage and one disadvantage and so could only score a maximum of 2. In 3(c) some candidates thought that the question was a comparison between NHS and private hospitals and answered accordingly – the regional hospital in their eyes was a private hospital. Candidates who interpreted the question correctly often gained 2 marks identifying better equipment and specialist staff but then failed to achieve the third mark associated with cost effectiveness. In 3(e) many students were not specific in their answers and wrote of nurses/doctors checking them without stating what exactly they were checking e.g. heart rate, blood pressure etc.

4) 4(a) was well answered showing a good understanding of the relationship between fewer smokers, less smoking related disease and therefore less cost to the NHS for treatment. Part (b) produced many different answers but a significant number continued to write about anti-smoking campaigns reflecting a need to read questions carefully before attempting an answer.

5) Question 5 was an accessible question and generally well answered and it was pleasing to note that few candidates were put off by the mathematical part in 5(a). A common error here, however, was a failure to square the height (1.5m) when calculating the BMI. 5(b) was well answered with error carried forward (ECF) being allowed from 5(a).

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

General Comments

Most candidates performed quite well on this paper. However, there were a significant number of no responses. Candidates should always be encouraged to answer all the questions; it is surprising how many marks can be picked up by the candidate attempting to answer a question they are unsure about.

This paper is now marked electronically and is scanned prior to marking.

Comments on Individual Questions

1(a) This proved to be a nice easy start to the paper and most candidates scored both marks. One mark was awarded for an all correct left hand side and another mark for an all correct right hand side.

1(b) This question required three responses for three marks. Most candidates scored all three marks but a common incorrect response was the fourth box “lots of staff to carry out all the procedures”.

2(a) Candidates were specifically asked for images in this question. Those candidates who scored well provided examples such as photographs, sketches or videos. Candidates who did not read the question carefully provided a range of incorrect responses. Mobile phone was credited for either video or photographs but not both. ‘Fingerprints’ was also allowed. Most candidates scored at least two marks on this question.

2(b)(i) Any answer between and including 32 – 33 was credited with two marks. Answers just outside this range i.e. 31 and 34 were awarded 1 mark. Those candidates, who gave their answer in cm, even though the units were indicated in the question, scored 1 mark for answers 3.2 or 3.3. Those candidates who crossed out the mm units and inserted cm were credited with both marks for a correct reading. Most candidates scored at least 1 of the 2 marks.

2(b)(ii) Credit was given here for any answer that referred to the mark on the hammer head. Credit was not given for reference to the shape or size of the hammer as it was not specific to this particular hammer. Thus “the shape of the hammer” did not score but “the shape on the hammer” did.

3(a) Most candidates managed to score some marks on this question. Credit was given for placing the specimen on the slide, adding a stain, covering with a cover-slip, and then viewing under a microscope. An answer of four correct stages in any order was credited with three marks. The final mark was given for a correct order. Two common errors included assuming that the word “stain” referred to a blood stain and not a substance with which to stain the specimen, and simply listing the words without a correct explanation. Candidates who simply listed the words did not score.

3(b) A surprising number of candidates did not score the mark for this question. Although most candidates did score, far too many were giving answers such as 2, 10 or 30. Some even managed to write down 20 x 10 and still produced an incorrect answer.

4(a) Most candidates scored 2 marks for this question for three correct labels.

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4(b) Many candidates failed to score on the question. The second box “.....has a more powerful eyepiece lens” proved to be a powerful distracter giving many incorrect responses. Clearly many candidates think that an electron microscope is just like a light microscope, but more powerful. This misconception needs to be corrected.

4(c) Only the most able candidates scored both of these marks. It re-emphasises the need to spend more time teaching students about electron microscopes. Clearly many candidates were just guessing. What was more disturbing was the fact that many candidates only gave one response, even though the question asked for two. This was simply throwing away the possibility of gaining an extra mark.

5(a) Most candidates correctly identified G as being the correct response to this question. However a significant number gave incorrect responses ranging from A to F.

5(b) Most candidates scored one of the two marks but only a few managed to score both. A common incorrect response was box 4 “join together Strands of DNA”. Candidates were possibly getting confused with genetic engineering.

5(c) Most candidates scored just one mark on this question. The most common response was to identify someone but unless this was linked to a reason, such as a suspect or a victim, credit was not given. Other good answers included paternity testing, identifying the contents in food e.g. pork, or diagnosing genetic diseases. Candidates who simply said “see what the disease is” did not score.

6(a) This was a graph question. It required candidates to plot five points correctly and then draw a line of best fit. The line of best fit was only awarded if drawn through the origin and at least the first five pre-plotted points. Most candidates scored at least one of these marks, but clearly drawn accurate graphs were not as common as they should have been.

6(b) This question required candidates to draw a ring around the outlier. Most candidates scored this mark. Credit was also given to those candidates who drew their ring around the correct number in the table.

6(c) Candidates were required to read a concentration from the graph. While most candidates were able to do this, far too many failed to provide the units and thus did not score the second mark. This was disappointing as the units were already provided on the graph. Answers between 3.5 and 3.7 g/dm³ were credited. Answers outside this range were not awarded neither was ‘error carried forward’ because the first five plots that contained this reading had already been provided.

6(d) This was well answered by most candidates who correctly identified the intensity of the colour as the correct response.

6(e) Almost all candidates managed to score at least 1 mark on this question. Five or six correct lines were awarded 3 marks, four or three correct lines; 2 marks and one or two correct lines; 1 mark. The most common correct response was those candidates who correctly drew the lines to and from the light microscope.

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

General comments

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 match the role and job but many could not match the organisations correctly to the roles that they carry out.

1(b) Most candidates were able to select the 3 examples of good laboratory practice from the options available.

2(a) Almost all of the candidates thought of 2 ways in which the scene of crime officer could record images and many got 3. Common mistakes included the idea of storage of images, not differentiating between pictures which are drawn and those which are taken, listing both drawings and sketches or suggesting the use of written descriptions. Some candidates talked about the evidence collected rather than how to record the scene or referred to the investigator's memory (which is unreliable).

2(b)(i) Only the stronger candidates were able to read the scale accurately. Some gave answers outside the acceptable range and many did not convert their reading from centimetres to millimetres.

2(b)(ii) Although many candidates understood that the nick shown in the hammer would be a means to identify its use as a murder weapon, a number did not refer to this particular hammer, and gave general answers - for example about finger prints and DNA or about the hammer's size and shape.

2(b)(iii) Most candidates were able to identify B as the plasticine mould made from the hammer; E being a common incorrect response.

3(a) There were some very clear descriptions of the procedures for microscopic examination given by students who were familiar with the technique and remembered it well. However, many misunderstood what the specimen was and described the blood as being a stain rather than recognising the need to stain the slide so that the cells would show up more clearly under the microscope. Some candidates made no attempt to describe the stages involved and just listed the words given in the question.

3(b) Very few candidates were unable to calculate the magnifying power of the microscope. A small minority added the figures together instead of multiplying them.

4(a) Few candidates could identify the parts of the atom correctly. There were a lot of cell parts; membranes, cell walls, DNA etc. Some identified the electron correctly but incorrectly labelled the nucleus as the atom.

4(b)&(c) Candidates struggled to choose the best statements to describe resolving power and depth of field of an electron microscope. Learning the meaning of important scientific terms is an important skill for candidates.

5) The technique of electrophoresis was poorly understood.

5(a) The diagram labels were not well known, the word negative was used correctly in most cases but electrode was rarely mentioned. Several candidates mixed this up with chromatography, using terms such as stationary phase etc and choosing paper instead of gel.

5(b) More candidates were able to correctly show the direction of travel of the negative particles but arrows started from many positions, and travelled in many directions. Many answers showed an arrow starting in the right hand beaker.

5(c) Only a small number of candidates were able to identify even one of the factors affecting the separation of particles during electrophoresis. Many candidates talked about the amount of particles affecting the separation and the fact that there would be positive and negative particles. Others thought that the charge on the electrodes would affect the separation. Many had no idea at all.

6(a) Candidates that could plot graphs generally did well here. A number of students plotted concentration against absorption and some did not label the axes at all, confusing themselves about which axis was which. Some used the data from table to create the axes giving a non-linear scale. There were surprising numbers of lines not drawn with a ruler, and some lines that went through just one of a correct set of points. Some candidates did not extend the graph through the origin.

6(b) Most candidates could identify the outlier but only the better candidates understood that the absorbance reading was higher than expected and so would be caused by a higher than intended concentration rather than by a more dilute solution.

6(c)(i) Most candidates were able to draw lines on the graph to show how concentration could be determined from the given absorption although a few simply showed a point on the graph line where lines would have intersected.

6(c)(ii) Most candidates used their graph to make relevant statements for validity or invalidity of the conclusion, however some did not refer to the graph or data at all.

7(a) Only the better candidates were able to correctly calculate the limits of uncertainty from the given data. Simple arithmetic let many candidates down with 87.9 and 91.1 being commonly given.

7(b) Large numbers of candidates were unable to choose the correct description of a random error in (i). In (ii), only a small minority were able to both choose systematic error and explain its meaning. Many were able to gain a mark by describing or explaining a sensible error.

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

General Comments

Centres have done a good job of matching candidates to the appropriate tier of entry. There was no evidence of time pressure, and it was good to see that most candidates felt able to attempt all of the questions.

It was noticeable that the omit rates (the measure of no attempt at a question) shot up for questions which required candidates to supply their own examples. This is a special feature of the Communications module, and centres need to bear this in mind when planning their teaching. Candidates should be given time to research their own examples of the various systems listed in the specification.

As in previous sessions, questions which required candidates to have memorised a piece of knowledge (such as a waveband) 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. This module requires them 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.

Many weak candidates had difficulty in producing clear answers to questions which required extended writing, but often fared better than candidates who simply restricted themselves to single word answers when descriptions or explanations were asked for.

Comments on individual questions

1) Part (a) required candidates to complete the block diagram for a TV system. Too many fell for the obvious distracter and put a switch in one of the input boxes instead of camera or microphone. Candidates were more likely to score the mark in part (b) if they suggested someone whose job was central to the communications industry (such as a satellite TV engineer) rather than someone with more general skills (such as a technician). Single word answers were unlikely to earn the mark. Even strong candidates did not know that information was carried down optical fibres by infrared; statistics suggest that most candidates seemed to be guessing. However, most candidates were able to earn one of the two marks for part (d), usually “that all of the image information was sent in analogue transmission”.

2) Although weak candidates often confused encryption with password protection, it was good to find that most candidates were able to show that they understood what it meant. The majority of candidates could provide their own example of a digital storage device, although a few weak candidates used the same example as in the stem. Centres should consider pointing out to their candidates in past paper practice, that this type of question often has an example in the stem to clarify it, so repeating that example can't earn any marks. Part (b)(ii) was a vocabulary test. Although most candidates got the last term correct, only a minority got all three correct.

3) Most candidates realised that the aerial of a radio set transmits waves, but only a minority used the term modulation to describe how the voice information was transferred to the radio wave. Many candidates were able to explain the importance of all communicators tuning into the same frequency, but very few knew that 433 MHz lies in the VHF region of the radio spectrum.

However, it was good to find that many candidates could successfully link each type of aerial to its feature. Similarly, most strong candidates could explain that batteries confer portability but mains power was more reliable or cheaper. Many weak candidates are still under the mistaken impression that electricity from a mains supply is stronger than that from batteries, allowing the walkie-talkie to have a greater range.

4) Many weak candidates simply joined each box on the left to two on the right for part (a). Some even avoided the obvious link from voltmeter to voltage. Strong candidates managed to earn both marks for part (a). Many weak candidates opted for plastic screws and a mains switch as the two safety features, earning no marks, but most candidates scored at least one for identifying the double insulation. It was worrying to find candidates opting for a metal-handled screwdriver as a safety feature. Part (c) proved to be difficult for all candidates, with a substantial minority declining to answer it at all, suggesting that they had never come across programmable devices in practical work.

5) This was the first of two questions which also appeared on the Higher tier paper. As expected, both proved to be more difficult than the previous questions. Many candidates risked one-word answers for their examples of shared codes, which could be visual or audio rather than electronic, with most strong candidates earning at least one mark out of two. Few candidates were able to state any advantages of digital coding; "faster" and "easier" were very popular responses which earned no marks.

6) It was good to find that many strong candidates were able to correctly identify the inputs and outputs of the circuit. Weak candidates, as expected, opted for the switch as the input for part (a). Although strong candidates knew that amplifiers increased the amplitude of a signal, whether it was direct or alternating seemed to be a mystery. Few candidates correctly identified the kitemark and explained its significance for safety; this part had the highest omission rate of the whole paper. However, most strong candidates could give a good reason why their example used a radio link, even if their response failed to make it clear what the system was.

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

General Comments

Many candidates entered for this paper earned very few marks in the last four questions, the ones which only appeared on the Higher tier paper. This suggests that they were only operating at grade C or below, so that may have been better served by the Foundation tier paper, allowing them more opportunity to show what they could do, and averting the risk of not getting a grade at all.

It was noticeable that the omission rates (the measure of no attempt at a question) shot up for questions which required candidates to supply their own examples. This is a special feature of the Communications module, and centres need to bear this in mind when planning their teaching. Candidates should be given time to research their own examples of the various systems listed in the specification.

As in previous sessions, questions which required candidates to have memorised a piece of knowledge (such as a waveband) 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. This module requires them 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.

Many weak candidates had difficulty in producing clear answers to questions which required extended writing, but often fared better than candidates who simply restricted themselves to single word answers when descriptions or explanations were asked for.

Comments on individual questions

1) This question also appeared on the Foundation tier paper, so provided a fairly easy start for most candidates. Many candidates could state two examples of shared codes for communication (which could be audio or visual rather than electronic), but only the strongest could state the advantages of digital transfer. One-word answers (particularly "faster", "cheaper" and "easier") risked earning no marks at all.

2) This question also appeared on the Foundation tier paper, with the majority of candidates earning at least half the marks. Strong candidates had no difficulty in using the circuit diagram to identify the microphone and loudspeaker as the input and output of the system. Weak candidates often opted for the switch or the battery as the input. Few candidates earned full marks for part (b), although many knew that the amplifier increased the amplitude of the signal. Only some of the strong candidates correctly identified the kitemark as indicating that the system had passed tests for safety or suitability. However, most candidates could clearly state a system which used radio waves as the link, with a sensible reason for using that link.

3) Although weak candidates earned no marks on part (a), most strong candidates could fill in the block diagram sensibly. It was a similar story in part (b), with weak candidates often trying to describe the block diagram of part (a) (for no marks), but strong candidates usually able to describe two things done by the people who manage the system. Only some strong candidates knew that information was carried down optical fibre by infrared; electric current in wires was a popular incorrect answer. Many candidates chose the internet as their example of a system linked by optical fibre and could give sensible reasons why it was used. The advantages of analogue transmission were known to very few candidates.

4) As expected, many candidates found this question very hard. In particular, only a handful of candidates were able to say anything sensible about measuring frequency with an oscilloscope, suggesting that this was something they had never met in practical work. Most fared better with the calculation, although too many weak candidates felt that they had to use all of the information provided (voltage, resistance and frequency) to calculate the current. Very few candidates could describe the operation of an earth leakage detector, often confusing it with a fuse or an earth connection. This is surprising, since all laboratories should be provided with one of these as a matter of course, so demonstrating its operation should be straightforward for centres.

5) This question also proved to be hard for many candidates. Sketching frequency modulated carriers in part (a) proved to be beyond the capabilities of most candidates. Similarly, very few candidates could state a frequency in the TV band, explain the meaning of the term bandwidth, or describe the best type of aerial for the handset.

6) This question proved to be more accessible than the last two, although only a minority of strong candidates could convert bytes into bits. However, most could demonstrate a good understanding of encryption and compression. Describing the function of a processor proved, as expected, to be difficult for most candidates, although many picked up one mark for mentioning that information passed through from input to output.

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

General Comments

The candidate entry and overall performance was similar to the previous four examinations sessions. There were some pleasing aspects of improvement such as

- fewer very weak scripts
- very few “no responses” i.e. no attempt at the question
- the vast majority of responses were within the allocated spaces.
- very few candidates ticked more boxes than required

For many candidates a better examination technique would have lead to a significant improvement in their final grade. Common errors included.

- Simply repeating the question or writing a low level answer (Q3(c))
- Not realising that when two marks are on offer, a detailed response is required (Q1(b), 2(c), 2(e))

Comments on Individual Questions

1) This question was based on growing *Fusarium* to provide protein.
It was generally well answered

1(b) Most candidates wrote a brief answer to explain why the mycoprotein was heated and only scored one mark out of a possible two.

1(c) This question required the candidate to compare a lot of data in the form of bar charts. It was pleasing to note that the vast majority of answers were well written and correct.

2) This question was based on milk production.
It was generally well answered.

2(a) Most candidates understood the term “gathered harvest”

2(b) The role of such organisations as The Milk Development Council is still not understood.

2(c) The causes of price fluctuation were well known. However, some candidates did not realise that two marks were on offer and failed to write down a full answer such as “A higher quality of milk will cost more” or “too much milk production will cause a reduction in price”.

2(d) As in part (c), candidates failed to write a full explanation of how microorganisms can spoil food. References to rapid growth/ reproduction were rare.

3) This question was based on breeding programmes (and a monster pig). It was also on the Higher Tier paper and targeted at Grades D/C.
It was generally well answered, with the marks ranging from 0 to the maximum of 7.

3(a) Questions on selective breeding have been set many times in previous examination papers. Responses to this question showed a slight improvement but nearly half the candidates failed to score a mark, despite many available marking points.

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3(b) Candidates were expected to identify the correct descriptions of various breeding programmes. Just over half the candidates managed to score the maximum 3 marks. A common error was in not identifying a natural breeding programme.

3(c) This question on explaining the method with the greatest chance of success was often misunderstood. The majority of candidates gave a very low level answer such as "Artificial insemination programmes have the greatest chance of success because they have the highest percentage". An answer based on selection of high quality sperm and inserting the sperm at the correct time was expected.

4) This question was based on growing rhubarb. Parts were also on the Higher Tier and targeted at Grades D/C. It produced a good spread of marks.

4(a) About half the candidates correctly identified the equation for photosynthesis.

4(b)(i) Candidates were asked to identify one condition being controlled in the diagram of the hut. The word "condition" caused much confusion with 40% of candidates scoring zero marks. Many candidates named parts of the hut and answers such as "fan" and "heater" were common. The second part, which asked for its effect on plant growth, was also badly done. Very few answers referred to growth being increased or decreased.

4(b)(ii) Candidates still have problems in identifying quantitative, qualitative and semi-quantitative tests.

4(c)(i) Candidates were required to calculate the missing values from the table of rhubarb yields. Most candidates were able to find the total mass but few were able to find the average i.e. divide by three. A common incorrect answer for the average was 43.5 instead of 43.6.

4(c)(ii) A wide range of answers was acceptable to explain why the crop yield in the hut was higher than that in the garden.

4(c)(iii) Many candidates appeared to have misread or misinterpreted the phrase "...why Charlie **can** charge more" and explained why she **had** to charge more i.e. more expensive to grow. Answers referring to high quality, being available out of season and being "soft and tender" (as described at the beginning of the question) were expected.

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

General Comments

The candidate entry showed a slight increase on the previous June examination sessions. The candidates' level of performance was very disappointing with approximately 20% of entries scoring less than 10 marks. This was in striking contrast to candidates' performance at Foundation level. When comparing questions set in both Foundation and Higher Tiers, data illustrated similar or poorer performance; usually Higher Tier candidates score higher marks. The specification puts topics that can only be examined at Higher Tier in bold type; these include embryo implantation (Q3(b)), stages of population growth in microorganisms (Q2(d)) and expression of DNA (Q4). From the general performance of candidates it was obvious they lacked information on these topics.

Common errors included,

- simply repeating the question or writing a very low level answer (Q2(b), 3(b)(ii), 3(b)(iii))
- not realising that when two or three marks are on offer, a detailed response is required
- not understanding the word "condition" in Q1
- badly drawn graph line in Q2(d)

Comments on Individual Questions

1) This question was based on the growing of rhubarb. It was also on the Foundation tier and was targeted at Grades D/C. Overall, the results showed good differentiation with marks ranging from 1 to 9 out of a possible 11 marks.

1(a) Only about 50% of candidates were able to correctly complete the word equation for photosynthesis. A correct symbol equation was accepted. Many candidates wrote the equation in reverse or included light instead of carbon dioxide.

1(b)(i) Only about 25% of candidates could correctly name a condition being controlled in the hut and explain its effect on growth. Many candidates named a part of the hut such as "fan" or "heater" and then wrote vague answers without any reference to plant growth.

1(b)(ii) In previous examinations, candidates have had difficulty in distinguishing between qualitative, quantitative and semi quantitative testing methods. There was a slight improvement in understanding but only about 45% of candidates scored both marks. Candidates had difficulty in linking inspection of leaves to qualitative testing.

1(c)(i) Only about 10% of candidates realised that the amount of water inside the rhubarb would vary and cause wet mass measurements to be inaccurate.

1(c)(ii) With many different marking points being acceptable it was disappointing to note that only about 55% of candidates scored both available marks. To explain why the crop yield was higher from the hut many answers very too vague or simply not relevant. Some candidates argued it was higher from the garden.

1(c)(iii) Many candidates misread the question about why Charlie **can** charge more (better quality, out of season, it is soft and tender) for her crop and based their answers on why she **had** to charge more (cost of electricity).

2) This question was on using *Fusarium* to provide protein.

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It showed good differentiation with marks ranging from 0 to 7 out of a possible 9 marks.

2(a) It was disappointing to note that only 15% of candidates knew that *Fusarium* would need glucose for energy/ food and air for oxygen/ respiration.

2(b) It was disappointing to note that only about 10% of candidates could offer an explanation as to why the fermenter needed a cooling system (respiration would produce heat/ high temperature would kill *Fusarium* / enzymes denatured, were all acceptable answers). The majority of answers were at a very low level e.g. "to keep it cool" was a common response.

2(c) It was obvious that many candidates had not learnt the advantages and disadvantages of using continuous culture and wrote vague answers such as "its quick and easy" and "expensive". About 75% of candidates did not score a mark.

2(d)(i) Candidates had to correctly identify both the lag and stationary stages to gain a mark.... only 10% of candidates managed to do so. The majority of candidates tried to describe the shape of the graph instead of naming the stages.

2(d)(ii) Most candidates realised that the population would decrease if the supply of glucose was stopped and scored one mark. To gain the second mark candidates had to draw a rapid decrease to zero or to the original level.

2(d)(iii) There were quite a few acceptable answers to identify another method of measuring population growth. However only about 25% of candidates could correctly name or describe such a method. Vague answers such as "use a microscope", "use a bar chart" and "count them" were common.

3) This question was based on breeding programmes (and a monster pig). Parts (a), and (b)(iii) were also on the Foundation Tier and therefore targeted at Grades D/C. The marks ranged from 0 to 7 out of a possible 9 marks.

3(a) Candidates were required to explain how the monster pig could have been used in a selective breeding programme. There were many possible answers (use its sperm, breed with large female pig, to get more large pigs, repeat process etc) at Grade D/C level. About 40% of candidates scored zero marks. Teachers should note that selective breeding is now included in Key Stage 3 Science.

3(b)(i) This question on listing the main stages in artificial insemination showed good differentiation. Candidates often missed out the storage / freezing stage in the process. However other stages, such as selecting the correct time of insertion of sperm, were also accepted. It was disappointing to note that nearly 40% of candidates scored zero marks.

3(b)(ii) It was obvious that the majority of candidates did not know about embryo implantation. Nearly 85% of candidates scored zero marks. Low level and incorrect answers such as "plant an embryo" and "fertilise an embryo" were common.

3(b)(iii) As at Foundation level, candidates wrote very low level answers to explain why one breeding programme was successful. Many candidates appeared to misread or misunderstand the question. Answers such as "because it has a 90% chance of success", were common.

4) This question was based on the importance of honey bees and included questions about the expression of DNA and genetic modification. Parts of this question were targeted at Grades A/A* and were therefore very demanding.

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4(a) Most candidates were able to score at least one mark to explain the concern about vanishing bees.

4(b)(i) This question was targeted at Grade A/A* and required candidates to realise that DNA contained the genetic code and link this to the production of proteins e.g. enzymes. Less than 5% of candidates described this link.

4(b)(ii) This question was also targeted at Grade A and required candidates to give a basic explanation of genetic modification i.e. taking a gene/ part of DNA from one organism and inserting it into the DNA of another organism. Less than 5% of candidates gave this description.

4(b)(iii) Candidates were required to name a genetically modified microorganism and its useful product. Such an example (yeast to produce chymosin) was the subject of a question set in 2008. The majority of candidates named organisms which were not microorganisms.

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

General Comments

Most candidates appeared to have been entered correctly for this paper. There was little evidence to suggest that any of the candidates should have been entered for the Higher Tier Paper. Some candidates were entered for this paper that would possibly have been more suited to Entry Level.

Only a small proportion of the candidates left blank spaces. Omissions can have a significant effect on the grade attained and therefore it is important that all aspects of the specification are covered and that candidates are encouraged to make a sensible attempt at every part of each question.

The overlap questions with the Higher Tier were: Qu2 part (d), Qu3 parts (a) and (b)(i) and (iii), Qu5 (b), (c), (d) and (e).

Recommendations for teaching

1. Give candidates plenty of practice at answering questions from past papers.
2. Encourage candidates to learn all the definitions within the specification.
3. Ensure that candidates have attempted a range of standard procedures.
4. Encourage candidates to read the question and answer the question that they have been asked.

Comments on Individual Questions

1) This question was about standard laboratory equipment and was intended to be an easy start to the paper. However many candidates appeared to have difficulty in matching the equipment to the appropriate name and the name to the appropriate use. Most candidates appeared to recognise the pipette but many then linked this to “measuring the volume of a liquid approximately”.

2) Candidates appeared to have little difficulty in part (a) recognising that pharmaceuticals were the largest percentage in the table.

In part (b) whilst many scored at least one of the marks for realising that the chemicals were organic and that those made on a large scale were bulk chemicals, few gave ammonia as an example of a bulk chemical.

In part (c)(i) oxygen was often given as one of the two elements but potassium was often not given as the other. The common wrong answer appeared to be nitrogen.

In part (c)(ii) many candidates appeared to have difficulty in reaching the correct answer of 7 for the total number of atoms.

In part (d) candidates appeared to be confused about the concept of sustainability. There were answers in terms of recycling, reusing and vague references to cost and making more products.

3) Few candidates in part (a) gave an answer in terms of purity as being the reason for the difference in cost. Incorrect answers were often a restatement of the information given in the table.

The calculation in (b)(i) was seldom correct. Many of the incorrect answers had the cost of 66g higher than the cost of the 0.5 kg of the laboratory grade potassium chloride that they started with.

In (b)(ii) the candidates that did not score the mark in part (b)(i) could have gained the mark here by giving an answer of 32p more than their answer to part (i).

Part (c) was intended to be straight recall of examples of solid mixtures. A surprising number of candidates failed to score both marks. There were candidates that circled all five examples and those who circled none of them. These candidates might well have scored at least one mark if they had selected two examples.

4) In part (a), whilst candidates generally gave the correct acid, some did not appear to know the meaning of the hazard symbol. It is recommended that candidates learn the hazard symbols and their meanings.

In part (b) it was intended that the candidates use the information in the table to arrive at the correct answer of copper oxide or copper carbonate and then give the reason based on the idea that either of these two react with the acid but copper does not.

Common answers that were not creditworthy in part (c) included responses like "add more acid", "change the temperature", "add more powder" and "use a different temperature".

5) In part (a) both reactants needed to be correctly named for the first mark. Common errors included using the wrong acid or just giving "acid" and using "ammonium" instead of ammonia.

A surprising number of candidates did not give the correct answer of funnel in part (b). The candidates that had carried out a similar practical, or seen it demonstrated, might have benefited from the experience.

In part (c) the candidates were expected to use an appropriate pH indicator or meter and give the correct response for the method chosen. There were candidates that appeared to have a vague recollection of what to do but gave insufficient detail to score any marks.

In part (d) candidates did not appear to know how to produce larger crystals. Common errors included heating/boiling in order to obtain larger crystals. Very few candidates gave a creditworthy response to the question "Why does it work".

The common wrong answer in part (e) was exothermic and some candidates gave neutralisation as the answer.

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

General Comments

Candidates were given 45 minutes to attempt the paper, which contained four questions totalling 36 marks. As in previous sessions there was no evidence that candidates required more time to complete the paper. A significant number did appear to have attended the examination without a calculator and consequently struggled to obtain full marks in the calculations.

Once again many Centres had entered candidates appropriately for the Higher Tier. Papers from these Centres revealed responses to all questions. Those candidates who would have been more suited to the Foundation Tier left many of the questions blank.

Recommendations for teaching

1. Encourage candidates to use the specification.
2. Give candidates as many opportunities as possible to complete practical work.
3. Encourage students to attempt plenty of past papers and whenever possible use the Examiner mark schemes to mark and correct their own work.

Comments on individual questions

1) This question considered the standard procedure to prepare a soluble salt.

1(a) A funnel was the expected response to this question. Those candidates who could visualise the piece of apparatus but could not recall the name drew a funnel and were awarded the mark. The word 'filter' was ignored if it preceded 'funnel'.

1(b) A large number of candidates suggested using Litmus to check the pH of the solution and were not awarded any marks. Of those gaining marks it was usually for mentioning that Universal Indicator solution was added to the ammonia and that sulfuric acid was added until the indicator turned green. It was important that they wrote what they would see to gain the second mark. If candidates mentioned that the pH of the solution was read from the scale and indicated that the solution was pH 7 then they were awarded the second mark also.

1(c) Those candidates who appear to have performed this procedure wrote some excellent answers to this question. The most common misconception was to heat the evaporating dish, using a Bunsen burner, to increase the rate of reaction.

1(d) This question proved surprisingly difficult, with most circling 'exothermic'.

2) Chemicals and their production were examined in this question.

2(a)(i) This was very well answered by the majority of candidates. Among the misconceptions shown were that 'bulk chemicals are bigger than fine chemicals' and that 'fine chemicals are more complex than bulk chemicals'.

2(a)(ii) Few candidates could recall the formula for sulfuric acid. Those who did wrote the formulae clearly, taking care to show all letters in capitals and numbers as subscripts.

2(b) Most gained the first mark for 'seasonal' and identified that 'equipment' and 'labour' should be used to complete the final two sentences, although more often than not they were written in the wrong sequence.

2(c) This was well answered by the majority of candidates. Examiners were particularly pleased to see clear workings for this calculation. A small number of candidates wrote '600' having misread '1000' presumably; other common mistakes included '1006' and '8000'.

2(d)(i) Most candidates obtained at least one mark for this question. The type of organic compound most commonly identified was the hydrocarbon. A small number of the most able candidates underlined the functional group within the formula.

2(d)(ii) This proved to be one of the most difficult questions on the paper with only a handful of candidates recalling the term 'functional group'.

2(e) The concept of reducing waste appeared most frequently in the responses seen and was awarded a mark. When a second method was provided it was usually to introduce the use of renewable resources. If a candidate failed to score any marks for this question it was usually because they did not understand the term 'sustainable'.

3(a) This was very well answered. Candidates who failed to gain a mark for this question usually referred to the strength of the chemical rather than its purity.

3(b)(i) Most candidates were able to score one mark for identifying that 0.5 kg = 500 g or that 500 g cost £9.36. Those without a calculator found it difficult to get the second mark.

3(b)(ii) Many candidates had a good understanding of why it was more expensive for Kai to make the mixture himself, but struggled to get their ideas across clearly.

3(c) Some excellent answers were provided here indicating that many candidates had spent time looking at a range of different examples. Candidates should be encouraged to provide two different types of example.

4) This question proved to be the most challenging on the paper. It tested candidates' knowledge and understanding of concepts from a number of sections in the specification.

4(a) Very few understood the term precipitation, with many referring to the geographical term.

4(b) Those candidates who had attempted (a) tended to score one or both of the marks available in this question. A few ticked more than two boxes while others ticked only one. The most common guess was 'sodium sulfate' and 'potassium carbonate', presumably because they appear at the top and the bottom of the list.

4(c)(i) This was generally well answered. If the Examiner could make out a circle and a flame the mark was awarded. A few drew another hazard symbol and wrote its name correctly beside the box.

4(c)(ii) Most candidates gained the point for this.

4(c)(iii) Once again Examiners saw some very clear workings which enabled them to award a significant number of candidates a method mark for this question.

4(c)(iv) Only the most able candidates were aware that an excess of sodium sulfate was used to ensure that all of the calcium nitrate was reacted.

4(c)(v) The vast majority of candidates understood the reason for rinsing the calcium sulfate. To gain the two marks they need to make it clear how rinsing removed the soluble salts.

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

General Comments

This paper is designed for candidates operating in the G-C range. There was no evidence to suggest that candidates had been inappropriately entered for the paper nor was there any evidence that candidates had any time difficulties with the vast majority completing in the time allowed.

Candidates should be made aware that the marking is done from scanned images of their scripts. Consequently, if candidates change their minds then any alterations must be made clearly and unambiguously. Any marks that are ambiguous will not gain credit on this paper.

Articulation was poor but use of scientific vocabulary was better than in previous years. Some topics appeared not to have been covered in any depth with many responses to questions 5 and 6 revealing lack of awareness of the concepts addressed in these questions; this was not shown in the quality of response in other items which suggests omissions in the coverage of the specification rather than deficiencies in candidate performance.

Comments on individual questions

1) The whole of this question was well answered although in part (a) some candidates linked brick to composite. In part (b) almost all could identify a polymer but a minority mixed metals and ceramics and in part (c) a common incorrect response was to link 'copper for wiring' with 'flexible and tough', candidates who did this usually linked rubber tubing to 'strong, conductor of electricity'.

2) In part (a)(i) the most common wrong response was to circle the upward pointing arrow. Part (a)(ii) proved to be the most difficult part of the whole question with the most common wrong answer being 'condenses', a number of candidates copied more than one response on to the answer line. In part (a)(iii) a number of candidates drew two lines from the same box on the left, both for wood and metal.

3) In part (a) the most common incorrect response was 'self cleaning' for coach windows whilst a flower vase had both self cleaning and toughened as common incorrect choices. In part (b) there was often confusion between transparent and translucent, whilst opaque was also a common error for bathroom windows.

4) In part (a) many non-scoring answers showed little awareness of testing the mechanical properties of a sample and there were a few descriptions of testing the wrong mechanical property, for example tensile strength or flexibility. The mark scheme allocated 3 marks for this part and the marks were given for (i) a method of compression, (ii) a method of increasing the compression and (iii) a method of taking a measurement at the point of failure whilst a possible mark was available for taking repeats. By far the most common lost marks were the last two with repeats only occurring in the odd paper. In part (c) most candidates could not name a composite, many putting plastic, PVC or an alloy. Responses which scored included carbon fibre and glass-reinforced plastic.

5) This was an overlap question with the higher paper and thus aimed at the C/D range of grades, even so the answers to this question were very disappointing and showed a lack of understanding about lenses.

In part (a) only a tiny proportion of responses showed any understanding of what was meant by image properties with the majority of candidates stating the image would be bigger or larger,

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which was already stated in the question, whilst others described the advantages of using a projector in the classroom. In part (b) the responses seemed to be randomly distributed. In (c)(i) most argued that a more powerful lens would have a longer focal length and many guesses were made for the unit of power in (c)(ii).

6) In parts (a)(i) and (a)(ii) many responses showed no understanding of the question. In part (b)(i) there was only a moderate understanding of the fact that the end of the linear region represents the end of the elastic region but the majority gained an error carried forward in part (b)(ii), whilst in part (b)(iii) there was little awareness of elastic and plastic behaviour suggesting little understanding of what the graph meant. There was a great difficulty in expressing ideas even though examiners were asked to be 'generous' with quality of English.

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

General Comments

Candidates for this paper who were able to use the correct scientific terms and quote examples from the specification were rewarded with good marks. However, it remains the case that many candidates appear to be unaware of a number of the specification statements and unable to produce examples of their own.

A feature of applied science courses is the use of real life scenarios to illustrate the basic science. For some weaker students, the use of such scenarios in an examination causes confusion.

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

Comments on Individual Questions

1) In part (a) a large number of candidates were unable to list any relevant optical properties, but used 'everyday' terms such as 'fuzzy' or 'blurred'. Part (b) received better answers, although in some cases the choice of letter appeared to have been random.

There was a common belief in part (c) that a more powerful lens would have a longer focal length. The diopetre is evidently not a well known unit.

2) Overall, candidates scored well on this question, with the majority showing a pleasing ability to interpret the graph in parts (b)(i) and (b)(ii). The term 'elastic' was better known than 'plastic', and the weak communication skills of some candidates meant that they failed to do more than repeat the stem of part (b)(iii) as an answer and so received no mark.

3) The requirement to "understand that a metal 'alloy' is a solid solution", is a clear specification statement. It was disappointing that only a very small number of candidates were able to select the correct description from the list in part (a). Much better marks were scored in parts (b)(i) and (b)(ii), where comprehension skills were needed. A majority of candidates were also able to provide sufficient explanation for a mark in (b)(iii).

In part (c), although a majority were able to give an example of an 'organisation' in part (i), very few correctly interpreted the question in part (ii). Most candidates described a safety test, for example 'crash testing' a car, whereas the question required a response referring to a safety 'margin'. The best answers referred to loading bridges or lifts beyond their designed load.

4) There were many sensible answers to part (a)(i), with references to 'thicker', 'stiffer' or 'stronger' components. However, the majority of candidates failed to understand what was required in part (a)(ii). A credit worthy answer was expected to refer to at least 'two' different materials, but many candidates described one 'artefact', for example a 'seat belt'. Very many answers were also in the context of car safety, which the question did not demand, and made the question more difficult to answer successfully. There were frequent references to 'composite' materials, which left those candidates in confusion when they answered question 5(a).

Once again, in part (b)(i) candidates demonstrated the ability to interpret graphical data.

However, considering the request in the question, surprisingly few answers mentioned 'momentum' at all, and few of those identified the constancy of the momentum as being a key factor.

The calculation in part (b)(ii) was poorly tackled. A very small number of correct answers were seen. Many responses tried to substitute the collision time (0.3 s) for the initial velocity (u) in the

equation. Credit was given where candidates had correctly calculated a momentum from their value of Δv .

5) Overall, the response to this question was disappointing. Part (a) is simple recall from the specification statement, but the majority of scripts scored zero. In part (b) there was considerable doubt shown as to the meaning of 'composite', only a very small number providing a correct example, and fewer still were able to explain how the component materials affected its properties. Many candidates incorrectly gave 'steel' or another 'alloy' as an example. In part (c) some candidates who had failed to give a composite as an example in the previous part did, erroneously, give one here. Many answers also failed to observe the request for 'another' example, and simply gave more details of a handrail. Here was a clear example of the context based question being difficult for weaker students to interpret. Part (d) was much better answered, although in (d)(ii) a surprisingly high number of candidates thought that steel would melt in a high temperature climate.

A337 – Additional Applied Science A

Work related portfolio

General comments

This was the second awarding for the Work-related Portfolio and the work seen indicated that the majority of the candidates studying this qualification are now competently completing six suitable standard procedures and carrying out a wide range of interesting research for the work related report. Most of the practical work seen for the suitability test showed appropriate work related links, with evidence that candidates are now appreciating the assessment needs for the suitability test.

Most Centres were very responsive in returning scripts for moderation and this is appreciated, as it supports efficient moderation. It was noticeable this session that the majority of Centres returned the Centre Authentication form with the candidates' work and most work was well organised and presented using treasury tags which allows moderators to easily read and locate the work. Some Centres were particularly good on annotation for class work activities as this appropriately supports the evidence in assessment of the practical skills. Where Centres are writing further comments on the work and giving page references, this is really appreciated and again supports the moderation process.

Where scaling of candidates' work occurred, it was mainly at the higher mark bands. Work submitted did not reach the necessary standards required by the assessment criteria i.e. 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 2008 and had made the appropriate steps to follow the guidance given. Candidates' work this session has shown a marked improvement in reflecting the needs of the assessment criteria.

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.

Standard Procedures

It was pleasing to see that the majority of the procedures completed by the candidates were suitable and allowed access to all four available marks. Some Centres produced excellent evidence sheets which included suitable instructions for the standard procedures, appropriate tables or spaces to record measurements or observations and a table showing the four assessment criteria with the mark awarded.

Most Centres used at least a two step activity and so awarded the 'following instructions' mark. Just a single step procedure or measurement, especially if only one result is recorded does not allow candidates to fulfil this assessment requirement. A common example was making a single measurement of pulse or taking a single temperature; candidates should be given the opportunity to make more measurements to allow all marks to be accessed. There was some evidence of Centres awarding the fourth mark when results were not of an appropriate high quality, particularly drawings of observations viewed under a microscope; these were not always sufficiently accurate to score the fourth mark. Also if observations are recorded rather than measurements the fourth mark needs to be supported by suitable detail, for example observations in procedures using Benedict's solution; just a statement of one colour is

insufficient for the fourth mark. Please note for the future 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. Some Centres asked for correct calculations from candidates for the accuracy mark. This is not a requirement, although where Centres want their candidates to process data, this is acceptable; candidates should not, however, be penalised if errors occur in such calculations.

Suitability Test:

Centres seemed much better this session in interpreting the assessment requirements of the four Strands for the Suitability Tests. However, Strand A and Strand D did cause difficulties for some candidates. Although some very good reports on suitability were seen, a limited range of practical activities were attempted. More innovative ideas would be welcomed. The most common suitability tests on materials/devices included suitability of thermometers, plastic bags, fishing lines, diving boards, antacids, with the most suitable procedures including use of pH monitoring, glucose monitoring, 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.

Strand A and Strand B

Most candidates were able to adequately identify the workplace aspect of their test, but tended to have difficulties in giving a full description of the desirable properties or characteristics. In order to achieve 6 marks for Strand A(a) candidates need to not only describe fully the desirable properties/characteristics but explain why at least one of these is necessary; simple statements were given here and not explanations. The practical work then should support the desirable properties and care needs to be taken that for Strand B(a) at 6 marks the candidates are given opportunities to carry out suitable complex tasks to support the suitability of their chosen material/device or procedure. Single step experimental procedures cannot really be considered as complex. 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. 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 Strand C many candidates had independently devised a suitable format for recording their results and good practice was seen where teachers had written on the candidates' work information which indicated that they had devised their own formats. In addition, however, care needs to be taken to ensure that the recording of all units is included for 6 marks for Strand C(a). Generally 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. A check for reliability tended not to be commented upon for Strand C(b) at 6 marks. 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. In Strand D, this session, more work was seen that related to the test results but candidates still need to ensure that even for Strand D(a) (4 marks) a correct conclusion is drawn which links to the purpose of the test. Generally many candidates scored 4-6 marks, with very few giving enough detail to score 7-8. For Strand D(b)

evaluation of testing the procedure used, limited evidence was seen on an evaluation of the method used to assess the most suitable material/procedure/device.

Strand E

Centres generally assessed this Strand appropriately. Candidates need to be aware that as well as including a contents page and numbering the pages work should be effectively organised and the level of the report should allow the inclusion of sufficient appropriate scientific vocabulary in order to reach 6 marks for this Strand. Where Centres are awarding 8 marks the report should reflect a high quality piece of writing that is well presented and structured and can support a full and effective use of relevant scientific terminology.

Work related Report:

Candidates had produced some interesting and well presented research work. It was good to see evidence that several candidates had clearly enjoyed working on this topic and the inclusion of interviews, results of questionnaires, photographs etc. supported research from a variety of sources. It was good to see evidence of visits to a range of organisations and the use of professionals working with schools to support the applied nature of this qualification. Centres do now seem to be aware of the need to support Strand A(a) at 6 marks with the collection of relevant information from a variety of sources including a practitioner and/or workplace. Again evidence to support 8 marks tended to be where assessment was not in line with the criteria. Work needs to include more explanations and suitable selection of research material. It was also felt that perhaps there was limited variety in this work related report as most candidates focused on Ap1.

Strand A and Strand B

Although many Centres are now collecting information from a variety of sources, there are still a number that are not using a workplace setting or practitioner. Some candidates although using a practitioner did not include the information within their report and just attached it as a separate section at the end. Best practice was seen where candidates had integrated the information into the whole report. Where 8 marks were being awarded for Strand A(b) candidates were including 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. An improvement of the citing of references within the text was seen this session, with more evidence of the inclusion of references for illustrations and charts. The quality of the content for Strand B was generally suitably assessed, although there was still evidence of excessive copying and pasting with no references. Again for 8 marks in Strand B(a) candidates need to explain the relevance of the qualities required for the work described. Some difficulties were seen in explaining the purpose of the work and the place in the wider organisation. Difficulties were seen for Strand B(c). Candidates had just used wages but omitted the impact of (high or low) wages on the work. Health and safety is a useful regulatory factor to use, however, the impact of this on the work needs to be focused on the future. The best Centres asked their practitioner for an example of a regulatory or financial factor and what its impact on the work would be.

Strand C and D;

Relating work to science in Strand C was often poorly done. Candidates often just identified the science involved but did not describe the knowledge needed for the work. Several diagrams of skeletons, muscles in the human body, crime scenes, patients involved in accidents were seen but no explanation of the scientific knowledge involved in the work described. Strand C(b), however, was much better with several good descriptions of technical skills needed. These could include the ability of the worker to be able to carry out a task; for example taking blood pressure correctly, giving appropriate first aid when required, suitable diagnostic work etc. For 8 marks, in

Report on the Components taken in June 2009

Strand C(a) both a description of the scientific knowledge with an explanation of how it underpins the work described is required and for Strand C(b) a description and explanation of a technical skill which is applied in the work place is needed. Generally Strand D was suitably assessed, but Strand D(b) requires more 'informative' visual material to score highly.

Grade Thresholds

General Certificate of Secondary Education
 Additional Applied Science (Specification Code J632)
 June 2009 Examination Series

Unit Threshold Marks

Unit		Maximum Mark	A*	A	B	C	D	E	F	G	U
A324/01	Raw	36				22	18	15	12	9	0
	UMS	34				30	25	20	15	10	0
A324/02	Raw	36	31	26	21	17	13	11			
	UMS	50	45	40	35	30	25	23			
A325/01	Raw	36				25	21	17	14	11	0
	UMS	34				30	25	20	15	10	0
A325/02	Raw	36	31	26	21	17	11	8			
	UMS	50	45	40	35	30	25	23			
A326/01	Raw	36				21	18	15	12	9	0
	UMS	34				30	25	20	15	10	0
A326/02	Raw	36	29	23	17	12	8	6			
	UMS	50	45	40	35	30	25	23			
A334/01	Raw	36				23	19	15	11	7	0
	UMS	34				30	25	20	15	10	0
A334/02	Raw	36	23	19	15	12	8	6			
	UMS	50	45	40	35	30	25	23			
A335/01	Raw	36				20	17	14	11	8	0
	UMS	34				30	25	20	15	10	0
A335/02	Raw	36	28	22	16	10	7	5			
	UMS	50	45	40	35	30	25	23			
A336/01	Raw	36				21	18	16	14	12	0
	UMS	34				30	25	20	15	10	0
A336/02	Raw	36	27	21	15	10	7	5			
	UMS	50	45	40	35	30	25	23			
A337	Raw	96	91	83	74	66	56	46	36	26	0
	UMS	150	135	120	105	90	75	60	45	30	0

Specification Aggregation Results

Overall threshold marks in UMS (ie after conversion of raw marks to uniform marks)

	Maximum Mark	A*	A	B	C	D	E	F	G	U
J632	300	270	240	210	180	150	120	90	60	0

For a description of how UMS marks are calculated see:

http://www.ocr.org.uk/learners/ums_results.html

Statistics are correct at the time of publication.

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