

Additional Applied Science A Twenty First Century

General Certificate of Secondary Education **GCSE J632**

Reports on the Units

January 2009

J632/MS/R/09J

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

General Comments

Overall this paper was challenging enough and there were no signs that any group had been disadvantaged by the language or any cultural issues. There were clearly different interpretations of whether Kalif & Hyat were male or female, but this did not interfere with the answering of the questions. It was good to see that candidates scored a lot better on blood vessels and joints than in January 2008.

A minority of candidates scored almost full marks, and everyone was able to find something that they could answer. There was no suggestion that the candidates had been under any time pressures and very few sections were left unanswered.

Comments on Individual Questions

- Q1 a) Generally answered very well with most candidates scoring full marks. A very few candidates only got the thermometer correct and opted to measure blood pressure with the syringe. Perhaps they stopped reading as soon as they came to the end of blood.
- b) Likewise, this question was generally well attempted with a large number of candidates achieving full marks. However, too many lost marks for “drink” without mentioning alcohol, or “family history” without mentioning medical. A few replicated their answers, for example, reference to allergy and personal medical history, and a few mistook the story line of new patients and their lifestyles, and had the nurse asking questions about their symptoms, as if they were actually having a medical consultation.
- Q2 a) This question was not very well answered. Most candidates referred to “sweat”, but the bulk stopped there, neglecting the cooling effect of evaporation. Many seem to think that sweat cools by being hot in itself (taking heat out of the body with it) and the cyclist will complete the system when he rehydrates with *cold* water. Only a few thought to comment on the skin flushing or reddening and the word vasodilation (in a variety of creative spellings) was not a common sight. A small number of candidates missed the point about Tim’s body trying to cool him down and talked at length about how **he** could cool himself down if he stopped cycling, had a rest in the shade and breathed deeply.
- b) This question was well answered with the majority of candidates scoring one mark for correctly identifying the muscle and a large number going on to score the second mark by correctly locating the tendon and/or the ligament.
- Q3 a) (i) Presumably a number of the weaker candidates did not bring a ruler into the exam, because some of the measuring was at best eccentric and often wildly wrong. The A-B was often reported as 1 (presumably measured in cm) through to the largest, at 100 meters.
- (ii) The subtraction was completely beyond a small number of the weakest candidates, who did not attempt an answer. However, most of the other candidates did this much better, usually laying out their working clearly and scoring the mark.

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- b) The majority of candidates scored both marks for this question, demonstrating a good understanding of the structure and function of different types of blood vessels.
 - c) (i) A good number of candidates picked up the reference in the question to “continuously” and went on to mention a heart monitor or ECG. However, some were clearly distracted by the idea that the nurse had to do it and started to describe the process of taking the pulse (and occasionally even making the patient exercise vigorously prior to recording the pulse rate).
 - c) (ii) Most appreciated the need to check that Kalif received the correct medication, but only a few individuals were able to see that the information would need to be made available to other health practitioners at some stage in the future. Centres do need to address the idea that written notes provide the main way of passing on information to others who one may never meet.
 - d) A good number of candidates had been very well drilled towards this type of question suggesting that some centres are beginning to use the previous examiners reports! Others were completely bemused and had no idea where the question wanted them to go. Good answers focussed on the roles of physiotherapists and dieticians, together with the GP. Weaker responses used doctors and nurses, and some merely used ‘health care workers’ from the question stem.
- Q4
- a) Again, there is evidence that some centres are using the examiners reports because more candidates than previously knew that dipsticks were quick and easy to use although they were not necessarily accurate. Surprisingly few mixed reliability with accuracy, although there were a couple of centres where the candidates thought that an advantage was that dipsticks could diagnose a variety of disorders and the disadvantage was that they were not hygienic..
 - b) This was very well done, although the higher level glucose/diabetes (and even hCG /pregnancy) were far more common than nitrite/bacteria.
 - c) (i) Most of the candidates plotted the points quite accurately (although the second point seemed to cause more problems than the others) but lines were often dreadful. A smooth curve through the points needs to be a single line. Credit was given to candidates who used a ruler to draw two straight lines, one from 100-40% and the other from 40-15%, but wiggly lines, multiple lines or a straight line of best fit through one or two of the points were not credited.
 - (ii) A surprising number of candidates deduced an answer of 3g/100cm³ even though this could not be obtained from their graph. They appear to have looked at the figures in the table and guessed at three.
- Q5
- a) This was often well done, although it produced a full range of marks, due to a number of candidates confusing hypothermia with a higher than average temperature.
 - b) Most candidates scored at least one of the marks for this question, appreciating either the process of prioritising patients, or the need to treat the most seriously injured first. A number of the more able candidates gave excellent answers encompassing the idea that more seriously life-threatened patients needed more urgent treatment which was often associated with the process of assessment or some suitable examples of who might be prioritised. A minority understood the question in the context of 5a which meant that they prioritised panic attacks or hypothermia, but as long as they made their reasoning clear, they also went on to score full marks. It should be pointed out, that questions with a direct link to one

another, are separated by (i) and (ii) whereas, a new, unlinked, part of a question has a separate letter, (a), (b) and so on.

- c) This question made the most demands on the ability of the candidates to express themselves clearly. Many had an intuitive idea of the difference between a symptom and the underlying cause – but could not explain it effectively in a suitable context. There were some excellent answers demonstrating a clear understanding of the difference between symptoms and cures. These generally involved choosing a good example, such as HIV/AIDS, hay fever, asthma, malaria, diabetes. In all these examples it was possible to state clearly that inhalers/injections of insulin/antibiotics could be used to relieve the symptoms, but that in each case, the underlying condition would still be there. With other, more mundane examples, it was still possible to get some good answers. For example, a broken bone gives rise to symptoms of pain which can be relieved using painkillers, but that does not cure the broken bone, it has to be set or possibly operated on in order to fix it.

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

General Comments

The overall performance of the candidates was good and it is pleasing to note that there are fewer candidates being entered for this paper when the Foundation Paper would be more accessible to them. There was no evidence of any candidates having insufficient time to complete the paper. Generally speaking, 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. It is worrying, however, that there are still a significant number of candidates who lose marks through failing to read the questions carefully enough. It is also important that schools should emphasise the importance of clear handwriting and following the guidance about writing within the framework of the paper.

Comments on Individual Questions

- Q1 This was an overlap question with the Foundation paper. Part 1(a) was generally well answered though the appearance of nitrate instead of nitrite was a common error. Part b(i) highlighted pitfalls associated with graph drawing. Candidates were asked to draw a smooth curve through the points and this should be a single fine line, preferably using a pencil. There were many examples of feathery lines which failed to gain the line mark. Ideally plotted points should be shown by a small cross over the point and a tolerance of +/- half a square was allowed. However, curve lines of over half a square in thickness (perhaps drawn with felt tip pens) often obliterated these points and made accurate reading of b(ii) difficult. 1c was also well answered with many candidates being aware of samples that would be taken by a hospital.
- Q2 a) (i) was very accessible and many candidates gained full marks here. The main error in 2b was a confusion by some candidates between triage and the treatment of the most seriously injured first and ABC treatment. 2c was a more challenging question requiring more than just a restatement of the stem of the question. Candidates who read the question carefully and used an example (as shown in the mark scheme) gained both marks whereas a general statement usually only scored one at best.
- Q3 It was disappointing to record how few candidates could explain how the process of sweating involves water being evaporated from the skin surface using body heat in 3a. 3b was more confidently answered and, although still present in some responses, fewer blood vessels are moving through the body to the skin surface! A common error was a mixing up of the terms vasodilation and vasoconstriction. Very few candidates were able to indicate that heat was lost from the skin surface by radiation/conduction. 740 Joules was a common wrong answer to 3c (i) which seems to indicate that the candidates have not read the question carefully as they are being asked for the extra energy required for a days ride – not just an hour. Underlining key parts of a question as they read it may help to prevent candidates missing important parts. In 3c(ii) answers needed to include a reference to high/more protein or carbohydrate intake to gain the marks rather than just eating protein or carbohydrate.

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- Q4 4a was a good discriminator as few candidates made the association between heavy smoking and the increased risk of illness and hence the 20+ smokers who were most at risk should be targeted. Ex-smokers and non-smokers were a surprising choice for a significant number of candidates with the explanation of 'to make sure they don't start!' Good candidates answered 3b well and it is pleasing to note that many candidates realise the cost implications behind NHS campaigns.
- Q5 Many candidates gained 1 or 2 marks in 5a but few went on to gain 3 marks, mainly because they did not record 3 points. It is important to remind candidates that if 3 marks are available then they should be writing down 3 separate points to stand a chance of gaining the 3 marks. 5b was well answered by many candidates.

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

General Comments

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

The paper is now marked by electronic marking after first being scanned and then fed electronically to examiners. It is now more important than ever that candidates use legible writing and restrict their responses to the boxes, spaces and lines that have been provided rather than writing in margins and other areas that may not be visible to examiners in the electronic copy.

Comments on Individual Questions

Q1 Part (a) was well answered with many candidates scoring full marks. It was pleasing to see that candidates are now performing well on questions covering this part of the syllabus.

Candidates did not perform quite so well on part (b) with “use up to date equipment” proving to be a powerful distracter.

Q2 This question was an overlap question with the higher tier. In part (a) most candidates scored at least one of the two marks. The most common correct response was estimating the cost of collecting samples. In part (b) once again most candidates score at least one of the two marks. Credit was given for any indication that the candidates knew the correct answers so that candidates who placed ticks against the two incorrect statements were credited even though the question asked for two crosses.

Part (c) should have been two easy marks, but as this was an overlap question and only quality responses were accepted. Examiners were instructed to look for specific examples so that candidates who just said “write it down” or “use a computer” were not credited. Good responses included using graphs, tables, charts or a specific computer display method such as a spreadsheet.

Q3 This question was also overlap.

In part (a) many candidates managed to score the mark for this question. Good answers included saying that more colours were available or that specific pHs could be determined. Candidates who simply stated that it was a more accurate or precise method were not credited.

Part (b) should have been relatively straightforward with orange and blue/green being the correct responses. However a significant number of candidates gave additional colours such as red and did not score. Yet other candidates failed to read the question and stated the pH of the soils in which the crops would grow. As this was not answering the question, these answers were not credited.

Part (c and d) were not well done. Even though the questions related to two specific specification statements, it was clear that the candidates were just guessing the answers. As this is only a 36 mark paper and this question covered two of those marks, candidates would be well advised to ensure that they know this section of the specification.

- Q4 This question used a format that has been on almost all of the foundation papers in recent years. Candidates simply have to choose from a series of prepared statements to answer the questions. As in previous years, there are still too many candidates who fail to read the question and manufacture their own answers. This is a dangerous strategy as the answers required are quite complex. All too often marks are thrown away because candidates fail to read the question carefully. Even those candidates who read the question did not find it straightforward and only the most able scored four or five of the available marks.

In part (a) the first statement proved to be a powerful wrong distracter. This was possibly because of the use of the word 'meter' in both the question and the statement. Part (b) had better answers with parts (c, d and e) proving to be the most difficult. Examiners had significant problems marking this question because candidates frequently changed their minds about their responses. This resulted in crossings out and lines drawn with double arrow heads (indicating a swapped response) often from one page to the next. As this is now marked on-line and examiners only see a 'letter box' of the answers it is all too easy to miss the fact that the candidate has changed their mind. Once this change is spotted examiners can go to full page mode in an attempt to sort out the candidate's response, but this is a risky strategy for the candidate to follow. Candidates would be well advised to first decide on all their answers before completing their responses, thus avoiding any changes.

- Q5 Question 5 (a) was generally well answered with most candidates scoring one of the two marks. Credit was given for drawing a mark directly above the banned dye and also at a level with 5cm. There was a small but significant number of 'no responses' for this question.

Part (b) was very well done with most candidates scoring full marks.

Part (c) was not so well done. Candidates often incorrectly guessed their answers. All too often the beaker was indicated as the mobile phase and the pencil line as the stationary phase. This is clearly an area of the specification that would benefit from being covered in more detail.

In part (d) most candidates only scored one of the two marks. Clearly candidates do not find the ideas involved in two-way chromatography easy.

- Q6 It was intended that part (a) would be an easy question. However candidates found this straightforward calculation most difficult. Incorrect answers included 1, 0.1, 25 and 100. Practice in performing this type of calculation would repay dividend in future years.

Part (b) was very well done with almost all candidates correctly identify D as the correct match and then going on to give a description of two common features. However the features had to be realistic and responses such as both have square blocks were not credited as this applied to all of the images. Responses that said that they both had the same pattern were credited. Good answers also included a reference to the pattern such as the arrow shapes or the four columns. Any reference to the horizontal mark such as "bald patch" or "mud" or just "a mark across the type" was credited.

Part (c) was generally well done with correct answers of 250 scoring both marks. However all too often candidate simply wrote down an incorrect answer and because they failed to show their working, as instructed, missed the opportunity of scoring at least one of the two marks for correctly realising that 25 should be multiplied by 10.

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

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

- Q1 a) Candidates struggled to recall the organisations from the specification but many were able to choose acceptable alternatives such as ‘the Police’. Many quoted individuals instead of organisations e.g. forensic science investigators. A lot of candidates also found the roles difficult to describe with vague answers such as ‘to protect consumers’ appearing frequently.
- b) Few candidates understood the need for standard procedures to increase reliability, and those that did very often did not give an example, so it was rare to see 2 marks for this part. Most marks were gained by identifying either repetition of tests or avoidance of contamination.
- Q2 a)/b) Most candidates gained 2 marks on each of these items, 0 marks were only rarely seen.
- c) Graphs, charts and tables were the most common correct responses here, although most other methods were suggested. A common mistake was to talk about presenting an investigation using e.g. PowerPoint, rather than the data. Other responses were too vague e.g. ‘written accounts’.
- 3 a) Explanations here were split between correct science and vague descriptions. Better candidates understood that it was the increased range of colours that gave Universal Indicator more precision. The best candidates linked this with pH, ‘each pH has a specific and unique colour’ for example.
- b) Despite being asked for the UI colour, some candidates gave numbers or litmus colours. For many candidates who considered UI it presented no problems, but some gave the range of colours rather than the one colour, e.g. red-orange.
- c)/d) Only a minority of candidates were able to accurately describe these tests. Many thought that the litmus test was semi-quantitative and the universal indicator test quantitative, but all combinations of answers were seen.
- Q4 Candidates who had used a colorimeter or covered it in detail gave much clearer responses to this question. Marks were often lost due to lack of clarity especially in understanding difference between precision, accuracy and calibration. A significant number of candidates were unable to score any marks.
- a) Many candidates did realise that this was necessary to zero or calibrate the colorimeter but too many still thought that it was done to clean out the apparatus from a previous experiment.
- b) Although few candidates understood that this was part of the calibration procedure, many did realise that it made the readings more accurate. Many answers were unacceptably vague, however, such as ‘so that the readings were correct’.
- c) Few candidates understood the need to measure the intensity of colour in known concentrations in order to produce a calibration graph. Some did realise that this was

needed for a comparison to be made with the unknown solution but too many thought that this was to check that the colorimeter was working properly.

- d) Only the best candidates realised that the calibration graph was necessary to find the concentration of the sample. The most common incorrect answer was 'to display his results'.
- e) Candidates struggled to describe the use of a calibration graph and there were few correct answers given. Some candidates realised that he could 'use a line of best fit' but did not say how.

Q5 As with question 4 it was clear which candidates had covered the use of chromatography esp. TLC, and those who had not.

- a) Many candidates were able to correctly draw the spot for the banned dye but dots placed at about 0.5 cm were common and some missed this question out altogether.
- b) Most candidates were able to correctly identify the samples although some lost the mark by saying 'toys'. Correct learning of terminology e.g. 'mobile/stationary phase' was less common than expected. Some candidates thought that mobile meant 'what is moving' or 'when things are moving' and stationary phase meant 'when it is stopped'.
- c) This was a challenging question and only the best candidates understood how chromatography works. Some were able to identify the need for the sample to be attracted to or soluble in the solvent in order for it to move up the paper but very few showed how this led to separation.
- d) Calculations of the R_f value were generally well done although some used 9cm instead of 10cm and some calculated 10/4.
- e) There were many good answers with most candidates scoring at least one mark – 'quicker' and 'accurate' were both common choices. 'It's easier' or 'cheaper' were common incorrect answers.
- f) It was good to see that a number of candidates remembered this. They did not always explain very clearly – but you could tell they had seen what happened. Whether candidates could answer this seemed to depend more on personal experience than on ability. Many focussed on the use of heat rather than the use of ninhydrin.

Q6 a) While most candidates realised that image C showed the greatest magnification, there were some who did not realise C was the same as the other images and chose B. Some explanations were too close to the stem of the question e.g. 'because it's the most magnified', perhaps because this is a word in common use. Some gave good answers in terms of pixels. Most successful explanations were in terms of how close-up or zoomed in it was. Those that lost the mark talked about clear/blurred and other descriptions to do with the focus. One or two talked about detail (ie resolution).

- b) Candidates found it very difficult to explain the meaning of resolution with most answers being too vague e.g. concerned with clarity or quality. Better candidates successfully referred to detail or number of pixels but few of these went on to explain the difference between high and low resolution.

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

General Comments

Although candidates performed better on this paper than in previous seasons, a substantial fraction would have been better served had they taken the Foundation Tier paper. Not only would they have had a more enjoyable exam experience, they would probably also have had more opportunity to show what they could do. All of the questions on this paper assume that candidates are operating at a minimum of grade C, often higher. It is therefore not fair to give it to candidates who are unlikely to get even grade C.

Nevertheless, about half of the candidates were well matched to the paper, having a go at all parts of every question except the one which required calculations.

Questions which required candidates to recall knowledge specific to the module proved to be much harder than ones which required candidates to process information provided in the question. Centres should seriously consider the advantages to their candidates of regular testing of factual information (including vocabulary) during the course.

Comments on Individual Questions

- Q1 This was the first of the easier questions which also appeared on the Higher Tier paper. It was disappointing to find that only the brightest candidates were able to do the calculations successfully. Too many candidates clearly had never met the formula $I = V/R$ before, as demonstrated by their inability to substitute 200 for R and 5 for V. Interestingly, candidates who were unable to calculate a value for the heating power of the resistor, still knew that the highest value for the rated power was the best one to choose.
- Q2 This question about a radio receiver also appeared on the Foundation Paper. As always, weak candidates had a tendency to confuse it with a radio transmitter and place a microphone in the first box and an aerial in the last one. The majority of weak candidates earned no marks for the block diagram, filling the boxes of the block diagram with processes (such as modulating radio waves) instead of devices (such as aerials and tuners), suggesting a serious lack of practice at this method of systems analysis which is so central to the course. However, the brightest candidates had no problem in filling in the diagram correctly, with the tuner being the most difficult to get right. Most candidates went on to interpret the next part of the question as another block diagram, earning no marks, with only the brightest candidates being able to sketch voltage-time graphs of signals entering and leaving an amplifier. However, about half of the candidates were able to say something sensible about frequencies of different channels for the last part of the question.
- Q3 This question was about radio transmitters. Many weak candidates assumed that it was about receivers, placing a loudspeaker in the last box. Nevertheless, this was the best answered part of the question. Few candidates were able to say or sketch anything sensible about amplitude modulation, often providing statements about coding which were too unspecific to earn any marks. Most fared better with the last part, provided that their answers made it clear that they understood the difference between reflection, absorption and interference. Many weak candidates lacked the linguistic skills to do this, and only the brightest candidates earned all three marks.
- Q4 Most candidates earned more marks on this question about telephone networks. It was good to see that so many candidates were able to interpret the block diagram and

complete it correctly. Similarly, many weak candidates were able to earn at least one of the two marks for the sequencing exercise about the difficult topic of analogue-to-digital conversion. Centres have clearly done a good job preparing their candidates for this topic.

- Q5 Only a small minority of candidates were able to state two advantages and two disadvantages of using batteries for portable electronic equipment. Too often they assumed that batteries were cheaper than using mains, and often discussed the benefits of rechargeable versus once-only batteries instead of answering the question. Despite adjusting the mark scheme to take account of this, the vast majority of candidates were unable to earn more than one mark. The second part of the question required candidates to recognise the symbol for double insulation. Most could not, so were unable to explain what it meant. It was the worst answered part of any question.
- Q6 The last question of the paper proved to be quite hard for most candidates. The first part required them to identify the input and output components of a circuit diagram and then write their names in a blank block diagram. As expected, many weak candidates assumed the battery on the left was the input and confused the LED with an LDR. However, even the brightest candidates wanted to use an LDR instead of the variable resistor shown. Only a minority of candidates were able to earn all three marks for the sentence completion, usually by failing to recognise that the signal was analogue, not variable or digital.

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

General Comments

This is the third time that this specification has been offered to schools. The specification is based on Products from Organisms from the Pilot Science E which was examined seven times. Entries were similar to those in January 2008.

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

Answers to Q2b and Q4bi showed poor examination technique. Many candidates ticked only one box instead of two.

The paper is now marked by electronic marking after first being scanned and then fed electronically to examiners. It is therefore very important 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. Candidates should be encouraged to think about their answer instead of writing down the first answer they think of and then have to cross out or attempt to alter it.

Comments on Individual Questions

Q1 This question was based on fish farming. Most candidates scored 3 or 4 out of a possible 5 marks.

- a) The majority of candidates correctly recognised the type of farming as intensive. A common incorrect answer was “hydroponics”.
- b) It was pleasing to note that almost all candidates were able to extract data from the graph. However, only about half the candidates correctly identified when the fish were growing the fastest. Many candidates found it difficult to name two factors that affect growth. A common incorrect answer was “overfishing”.

Q2 This question was based on tomato seeds.

The majority of candidates were able to correctly identify the part containing seeds.

- a) Many candidates only used one tick instead of two, showing poor examination technique.
- b) It was surprising to find many poor answers to describe how to test whether the germination rate was 98%. Few candidates managed to score the maximum 3 marks.
- c) This question on identifying advantages and disadvantages of various growing media was very well done.

Q3 This question was based on types of farming.

- a) Most candidates were able to work out the correct percentage of mixed farming. A common error was simply to add up the figures without then subtracting it from 100.

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- b) This question on the advantage of having mixed farming produced a wide spread of acceptable answers.
 - c) Many candidates failed to recognise what is produced from poultry farming.
- Q4 This question was based on milk processing. It was also on the Higher Tier and therefore targeted at Grades D/C.
- a) Some candidates failed to gain marks by using vague statements without including a comparison. For example, "It has less fat", was not accepted since it did not refer to either whole or skimmed milk.
 - b) In part i) most candidates were able to correctly identify the two stages involving testing. However, as in Q2b, some candidates only ticked one instead of two boxes. As in previous examinations, many candidates in part ii) found it difficult to distinguish between qualitative and quantitative testing. Parts iii) and iv) required a good understanding of the effect of temperature on bacteria and the answers showed a wide range of understanding.
- Q5 This question was based on a plant crop such as borage. It was also on the Higher Tier and therefore targeted at Grades D/C. It proved to be rather demanding.
- a) As in previous examinations, there was confusion between organisations that regulate agriculture and organisations that support the food industry. Examples are clearly stated in the specification.
 - b) Few candidates realised the importance of pollination to borage plants. Very few candidates realised that the bee hive owners would not want their honey to be contaminated by a nearby GM crop. It was disappointing to note that only about 10% of the candidates correctly calculated the value of the borage crop.

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

General Comments

This is the third time that this specification has been offered to schools. The specification is based on Products from Organisms from the Pilot Science E which was examined seven times. Entries were similar to those in January 2008.

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

The paper is now marked by electronic marking after first being scanned and then fed electronically to examiners. It is therefore very important 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. Candidates should be encouraged to think about their answer instead of writing down the first answer they think of and then have to cross out or attempt to alter it.

Comments on Individual Questions

Q1 This question was based on fish farming.

- a) Most candidates correctly identified the type of farming as intensive. A common incorrect answer was “selective”.
- b) Only a few candidates scored two marks by identifying B as the correct stage and realising it was at the end of the period of fastest growth.
- c) Very few candidates scored the maximum three marks to explain why the farmed cod grew faster than those swimming freely. Candidates must realise that a full explanation is required when there are three marks on offer.
- d) Most candidates were able to name a crop that was usually measured in dry mass.

Q2 This question was based on the processing of milk. It was also on the Foundation Tier and targeted at Grades D and C. As expected, the candidate’s performance was better than that in the Foundation Tier.

- a) Most candidates scored at least one mark to explain why semi-skimmed milk has the highest sales.

The identification of reasons for testing and a qualitative test was quite well done. In parts iii) and iv) some candidates did not give full explanations of bacterial action.

Q3 This question was based on a plant crop such as borage. It was also on the Foundation Tier and therefore targeted at Grades D/C. As expected, the candidate’s performance was slightly better than that in the Foundation Tier.

- a) Only about half the candidates realised the importance of pollination i.e. to lead to fertilisation and the production of seeds/oil.

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- b) As in Foundation Tier, very few candidates realised that the bee hive owners would not want the honey contaminated by the nearby GM crop.
- c) It was surprising to find that only about 20% of candidates correctly calculated the value of the borage crop.

Q4 This question was based on fermentation of Tequila.

- a) There was a disappointing response to these recall questions on the type of organism used in fermentation, the word equation for anaerobic respiration and the advantages of a continuous culture.

In contrast, this difficult sequencing question on GM was very well done.

Q5 This question was based on using selective breeding to produce good cricket bats.

- a) Candidates had no problems in identifying reasons why cricket bats from Kashmir were cheaper.
- b) Most candidates were able to identify two required characteristics.

The lack of knowledge about the stages of selective breeding was disappointing. Many candidates confused the process with GM and cloning; most candidates realised that it would take many years for the trees to grow but very few knew that many generations would be required.

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: Qu3 parts (b) and (c), Qu5 parts (c),(d) and (e) (ii) and (v).

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.

Ensure that candidates have attempted a range of standard procedures.

Comments on Individual Questions

- Q1 In part (a) the candidates were asked “why is mineral water an example of a solution”. Many candidates either did not answer the question or did not appear to understand the term solution and did not say that minerals were dissolved in water.

Most candidates ticked the correct box in part (b) indicating that the pH had decreased. Whilst many had the correct answer of Mg for the symbol for magnesium there were some giving mg and Ma. Candidates should be encouraged to clearly distinguish between upper and lower case letters when writing chemical symbols (or formulae).

The candidates were expected to use the information on the label to help them answer part (c) (ii).

The calculation in (c) (iv) was not well answered. There were few totally correct answers and many did not give appropriate working out, or any working out, in order to score 1 mark. The correct answer of 7.5 (mg) scored both marks.

- Q2 Most candidates scored at least 2 out of the 3 marks available for part (a). A common wrong answer was “what is the petrol needed for”.

In part (b) (i) most gave the correct response of highly inflammable. In part (b) (ii) some candidates appeared to have overlooked the stem of the question, which was asking why it was important for the emergency services to know how to clear a spillage. There were some responses in terms of the flammability of petrol.

- Q3 In part (a), most candidates correctly made reference to the fact that Sucralose was sweeter than Saccharin. A common response that did not gain credit was stating that Sucralose does not use coal or crude oil without stating why this was an advantage.

In part (b) many made appropriate references to the fact that it needed to be tested to ensure that it was safe for use. There were some responses that made reference to the difference in formulae being the reason why it was several years.

Part (c) was usually answered correctly. The common wrong answer appeared to be "bulk".

- Q4 Many candidates did not appear to know the correct formula for nitric acid in part (a). There were some candidates that gained credit for the correct response but circled the answer instead of writing it in the table.

In part (b) (i), whilst there were many correct responses the common wrong answer was "ethanoic acid".

Part (b) (ii) produced a variety of responses, some of which were not from the table. A common incorrect response was "Na".

Part (b) (iii) was generally well answered. A common error was to have calcium carbonate as one of the reactants.

- Q5 Whilst many scored the mark for the correct reactants in part (a), far fewer correctly identified carbon dioxide as the gas produced.

Most candidates gained credit for a suitable piece of measuring equipment in part (b). Common unacceptable answers were conical flask and jug.

In parts (c) and (d), those candidates that had seen a similar experiment carried out in the laboratory were probably more able to recall correct responses. A common response that did not gain credit was a reference to ensuring fair testing.

In (e) parts (i) and (ii) there were some well plotted points and correctly drawn smooth curves. There were also examples of points which appeared to be large blobs and curves that were thick lines.

The common mistake with the plotting appeared to be misreading the volume scale and placing the values at 5 and 6 minutes, one little square too high. Some curves were drawn as 'dot to dot' lines or using a ruler or missing points out.

Part (e) (iii) produced many correct responses. There were candidates that did not appear to know how to use the graph to find the volume of gas collected. There were also some answers given in the table that did not match the answer obtained from the curve drawn by the candidate.

In part (e) (iv) many did not appear to know where the reaction was fastest. Whilst wrong answers appeared in many different places a common wrong answer was to label A on the curve somewhere between the time of 5 and 6 minutes.

In part (e) (v) more candidates correctly had a curve that started off more steeply, than had one that finished at the same total volume as the first curve.

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

General Comments

The examination was relatively short, covering 36 marks in 45 minutes. There was no evidence that candidates were short of time. Only a small proportion of the candidates left blank spaces. This seemed to be due to a lack of knowledge and understanding as against insufficient time. Any omission can have a large effect on the grade attained and so it is vital that all aspects of the specification are covered and that candidates are encouraged to attempt every question.

Many Centres had targeted Higher Tier candidate entry well this session. Some candidates are still being entered for this paper when they would possibly have been more suited to the Foundation Tier. In these cases it appeared that candidates had not been taught the required additional skills, such as balancing equations.

Recommendations for teaching

- 1 Give candidates plenty of practice at answering questions from past papers.
- 2 Encourage candidates to learn all the definitions, such as 'batch' and 'fine' and memorise the required examples.
- 3 Ensure that candidates have attempted a range of standard procedures; including weighing, filtering, heating using a water bath and that they are aware of safety hazards and precautions.

Comments on Individual Questions

- Q1 This question was attempted by all candidates and it was clear that many had attempted this, or a very similar practical.
- a) Only the most able candidates scored both marks for this question. A large proportion of the candidates had not memorised the formula for calcium chloride and consequently struggled to balance the equation. Among the most commonly seen errors were changes made to the formulae and 50 cm^3 in front of the hydrochloric acid. Examiners were pleased to see an improvement in the accuracy of writing chemical formulae.
 - b) This question was very well answered. A few candidates thought that it was to stop air from entering the reaction, while others were too vague in their answer, stating only that data obtained would not be accurate or reliable.
 - c) This question was accessible to all students, with the vast majority obtaining the mark.
 - d) (i) Examiners were pleased to see students taking care to plot all points accurately. The most common error occurred when plotting the last two points. Some plotted them at the incorrect time and others plotted them at the incorrect volume of 104 cm^3 .
(ii) Many candidates drew an excellent curve of best fit. Those who were not awarded this mark failed to take the line through the origin, drew breaks in the curve or joined all the points using a ruler.

- (iii) This proved to be the most challenging question on the paper, with only the most able achieving maximum marks. Many did not state the effect on rate, but the effect on volume. Many explanations failed to mention particles or referred to changes in their energy.
- (iv) A surprisingly large number of candidates left this question blank. Those who attempted it generally scored one mark for drawing a steeper curve. Very few recognised that the same volume of gas would be produced.

Q2 All candidates attempted this question, reading the information provided to construct some excellent answers.

- a) The vast majority of candidates obtained one mark for recognising that sucralose is sweeter than saccharin. The second most common response referred to the concept of renewability. Examiners were pleased to see a significant improvement this session in the understanding of the term renewable. A small number of candidates also mentioned the need for smaller quantities of sucralose.
- b) Most candidates understood the need to test the sucralose. Only those answers stating that this was for safety were awarded the mark.
- c) A significant number correctly identified food additives as fine chemicals. The most common distractors were 'bulk' and 'small'.

Q3 This question differentiated well.

- a) Candidates of all abilities identified ethanol as the alcohol. The most commonly chosen incorrect answer was ethanoic acid.
- b) Examiners were pleased to see that all but a handful of candidates wrote the method used to calculate their answer. Most knew to find the sum of the relative atomic masses. 68 and 124 were frequently seen among the incorrect answers, demonstrating a lack of understanding of numbers in formulae.
- c) Very few candidates left this question blank. Approximately half the candidates correctly gave the name ethanoic acid. A few completed the equation using the name of the homologous series, carboxylic acid, which was insufficient. Those candidates who guessed often gave calcium carbonate, presumably as it was the focus of the last question.

Q4 While this question proved challenging to most, it was good to see candidates reading the information provided to formulate an answer.

- a) (i) A degree of centre-dependence was seen in the responses to this question. Among the best answers provided were 'the reactants are all added at the start and all the products are removed when the reaction has finished.' Reference to making chemicals in small quantities was insufficient to gain a mark.
- (ii) Most candidates were awarded two marks for this question, recognising that the petrol evaporated and then condensed. Only a small number knew that petrol evaporated first as it had the lowest boiling point. The weakest candidates mentioned only the route that the crude oil took through the apparatus and failed to use scientific terms.

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- b) Most obtained one mark for recognising that this process was quicker. A few were aware that this would be a cheaper process but failed to make it clear that this is due to the reduced amount of labour required.
- c) (i) Candidates of all abilities were able to make sensible suggestions.
- (ii) Precautions to be taken to keep others safe proved more challenging. Among the best answers provided were 'do not smoke' and 'keep sources of ignition away from the oil'.
- Q5 a) While most candidates referred to the terms solvent, solute and solution, a significantly large number did not know what they meant. Those stating that a solute and solvent mixed to form a solution were not credited with a mark.
- b) This question was checking that candidates could interpret the names of a chemical from a formula. A large number wrote the names next to each formula and then referred to the label provided at the start of the question. Most candidates correctly chose 'KCl'.
- c) This was well answered by candidates from all centres. The most common response seen was 'carbon dioxide is acidic'. Answers referring to carbon dioxide 'neutralising' the water were awarded the mark also.
- d) (i) To be able to answer this question candidates needed to know that 1litre contains 1000ml. A large proportion correctly arrived at the answer '7.5'. Guesses included 30mg and 300mg.
- (ii) Most candidates understood that the precipitate was a chloride. Only the more able were aware that the silver nitrate reacted with the chloride to form silver chloride. Silver nitrate was the most common distractor. This was possibly because nitrates were the first in the table.
- (iii) Most candidates knew that the precipitate needed to be dry before it should be weighed. Answers stating 'evaporate it' were not credited with the mark as it was unclear whether they meant evaporate the precipitate or any water on it.
- (iv) The most common incorrect answer seen for this question was that Edward tested only 250ml, when the label was for 1litre. The higher ability candidates referred to how the process involves transferring the solution and chemicals from one container to another and that this can lead to loss.

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.

Candidates were reasonably well prepared in most areas of the specification, however there were weak responses to questions which asked for prepared examples. This specification requires candidates to prepare examples which illustrate the application of a scientific principle. Centres are free to choose convenient examples, but candidates need to learn these in order to answer the relevant questions.

It is important to emphasise to candidates the need to answer the question asked, not the one that they were wanting 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, similarly if they are asked to '*name a job*' then it is expected that a job will be mentioned in the answer.

Better fluency in using scientific vocabulary would have improved the accuracy of many answers and some candidates may have gained more marks if they had been able to express their ideas.

Comments on Individual Questions

- Q1 a) Most candidates identified transparent for the glass in an oven door but had more difficulty with opaque and translucent.
- b) Most candidates knew that polymers were flexible and ceramics brittle but which was tough proved more difficult. A significant no of marks were lost because of 2 ticks per line. Many lower-scoring candidates ticked tough for ceramics
- c) This question proved to be a massive problem with the vast majority of candidates incorrectly choosing marble as the correct answer because marble 'let heat through'. Those who selected cork did not always gain the second mark, usually because of an answer that is too vague eg 'it feels warm'.
- Q2 a) The majority of candidates knew that a shiny material would reflect light but malleable and ductile were often reversed and brittle was often chosen for hard as a property to resist scratching.
- b) This was well answered with candidates knowing that gold alloys were more scratch resistant many other suitable properties were suggested. Some suggested that Louis would perform a Suitability Test to decide which alloy was best fitted to its purpose, but these answers were not credited.
- Q3 a) (i) and ii were well answered. Although in (i) all distractors were selected on occasion, the most frequent choice was 'thermal expansion' and in (ii) where one mark was lost, the most common distractor was ceramic.
- b) Many candidates identified the freezer as the correct appliance but lost the mark because they simply stated that the conductance was '*the lowest*' or '*nine*' but did not state that it was less than the minimum safe conductance.

There were several common reasons for not gaining this mark. In order of frequency:

- comparison with other appliances instead of with minimum acceptable value, including answers which describe the low value as an outlier
- giving an absolute value or comment, with no comparison to the minimum safe value (eg 'very low')
- selecting the kettle because of its high conductance
- saying that the freezer gets cold, whereas the other appliances get hot.
- selecting the kettle because it gets very hot.

Q4 a) (i) This proved a strong discriminator with good candidates usually answering this correctly whilst weaker candidates scoring zero.

(ii) This was answered well.

b) This was answered well.

c) (i) This was answered well

(ii) This question gained a mixed response. In general it was marked in such a way that '*named hard materials reflected the sound*' and '*named soft materials absorb sound*' would gain two marks, so that double glazed windows reflecting sound gained the benefit of the doubt even though in the context of this question it is highly unlikely that noise outside of the room was a contributor to the intensity level. This was the first question in this paper in which the word 'foam' starts to appear in answers (it also appears in several others). Unless the foam is identified more clearly then it will not be credited with any marks. Those gaining 1 mark often confused 'absorb' and 'reflect' or referred to 'soundproofing' without adding creditable detail.

Q5 This question was an overlap question with the higher paper and it proved difficult.

a) This was a straight forward definition but many stated that velocity was how fast speed changes, others had more than one line joining the middle row of boxes and more than three from the middle to the third row. Many candidates gaining one mark had indicated 'in a particular direction'.

b) It was fairly obvious from the answers to this question that few candidates had calculators available for this paper and the arithmetic often proved too difficult to gain full marks.

c) (i) The answers to this question were rather disappointing with few candidates relating the increase in the time of impact being related to '*less force*' being exerted on the driver. There was no evidence of the use of ' $Ft = \text{change in momentum}$ ' and relatively few responses were based on the devices listed in the specification (seat-belts, car crumple zones, helmets). Use of the word force was extremely rare. Momentum was mentioned rarely, but the term was used incorrectly. The word 'impact' was pervasive and used with no clear indication of its meaning.

The very great majority of responses interpreted 'impact time' as a stretch of time leading up to the collision, in some cases even suggesting that, by extending this time, the impact could be avoided. Most responses suggested that it would allow people to prepare for the collision and would allow the car to slow down before the collision took place.

(ii) This was a poorly answered question with few candidates naming the mechanical property required for a material to improve road safety. This

question required recall of a prepared example(6.2.21) but few candidates gained both marks, and there were many no-responses. Very many responses failed to gained marks because they did not refer to a material or to material / mechanical property.

Q6 This question was an overlap question with the higher paper and as such proved difficult for weaker candidates, it was also a question in which candidates did not always answer the question asked.

Most responses included relevant details but

- a) This required a named job along with a property of a material to gain the mark, thus 'a joiner requires a knowledge of wood' does not give a property of wood and would not gain a mark, relatively few included both an occupation and a material property.
- b) Many materials were mentioned, along with the famous 'foam', but there were few examples of how these materials could be used or how they might reduce the vibrations. Some candidates suggested an appropriate material, but few correctly suggested where it should be placed. Some stated that vibrations should be absorbed. A tiny minority referred to springs or to a damper.
- c) This was very poorly answered, candidates need to know that a composite is at least two materials where one material is embedded in another. Many answers focussed on the performance rather than the structure of a composite material, usually giving correct details but gaining no credit. The Foundation specification statements referring to composite materials refer only to their structure and use, not performance.

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

General Comments

The entry for this January was the largest so far for this season, although only a quarter of that made last June. The responses indicated that there are a number of areas of the specification which are receiving inadequate preparation. Many entrants achieved low overall marks from responses that were confused or lacking in detail and which sometimes indicated little understanding of the subject matter being tested, relying on general rather than specification specific knowledge. Such candidates would have been better served by entering for the Foundation Tier. It was evident that many centres had prepared candidates by the study of past papers, which is commendable; however, weaker candidates had a tendency to regurgitate responses without understanding the different nature of the question being asked.

Comments on Individual Questions

Q1 Part (a) was well answered by most candidates.

Part (b) was surprisingly the question with the second highest facility of all. It is encouraging to see that candidates are able to manipulate simple calculations of scientific data.

In part (c) (i) many candidates referred to 'impact' rather than force, and some simply restated the question stem, rather than link the answer to a reduction in force. For part (c) (ii) the major difficulty was that although many candidates could name an artefact that would improve road safety, most were unable to give the material from which it was made or describe which mechanical properties were relevant.

Q2 Part (a) was well answered, with the mark being lost where candidates failed to specify both the job and the material demanded.

In part (b) responses were often appropriate to sound absorption, but not for this situation. A substantial minority of candidates had learnt the specification definition of composite material for part (c), and others gained the marks from a diagram that clearly showed one material embedded in another. Carbon fibre composite was often described as being made from 'carbon' and 'fibres'.

Q3 Part (a) elicited some curious responses, with a wide variety of non-thermal experiments being described. It must be hoped that experimentation is not so rare that candidates feel able only to describe one of the few they have experienced. Where an expansion experiment was described it was often qualitative not quantitative and sometimes referring to conduction rather than expansion

For part (b) more than half of candidates could identify an increase in volume, but far fewer were able to extend this to the change in density.

Few candidates scored well in part (c). Many identified an example but failed to name two materials and could not explain why they must match. The best answers focused on glass windows in greenhouse frames, or metal alloys in car engines, although naming the materials was still a problem.

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Q4 A majority of candidates could retrieve the required values from the graph in part (a), but far fewer recognised the need to calculate the area under the line. The minority who could rearrange the formula in part (b) were able to perform the subsequent calculation. Very few could identify the correct units.

Q5 Part (a) (i) was the best answered question on the paper. Disappointingly only a small number of candidates were able to correctly identify the focal plane in part (a) (ii). An even smaller number correctly answered part (a) (iii).

Both sections of part (b) were very poorly attempted, with candidates either misinterpreting the question or reiterating that the image was larger.

Part (c) (i) was also surprisingly poorly answered, with the overall response being little better than chance.

Most candidates could recall another appropriate optical instrument for part (c) (ii). The answers to part (d) showed a remarkable lack of knowledge of the specification statements. Responses that were specific to one type of contact lens (eg soft) were not credited. There were a very small number of perfect responses, quoting directly from the specification. Most candidates however, tried to use their general knowledge rather than the course content, with disappointing results.

Grade Thresholds

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

Unit Threshold Marks

Unit		Maximum Mark	A*	A	B	C	D	E	F	G	U
A324/01	Raw	36	n/a	n/a	n/a	26	22	18	14	10	0
	UMS	34	n/a	n/a	n/a	30	25	20	15	10	0
A324/02	Raw	36	31	26	21	17	14	12	n/a	n/a	n/a
	UMS	50	45	40	35	30	25	23	n/a	n/a	n/a
A325/01	Raw	36	n/a	n/a	n/a	26	22	19	16	13	0
	UMS	34	n/a	n/a	n/a	30	25	20	15	10	0
A325/02	Raw	36	30	25	20	16	10	7	n/a	n/a	n/a
	UMS	50	45	40	35	30	25	23	n/a	n/a	n/a
A326/01	Raw	36	n/a	n/a	n/a	17	14	11	8	5	0
	UMS	34	n/a	n/a	n/a	30	25	20	15	10	0
A326/02	Raw	36	32	26	20	14	9	6	n/a	n/a	n/a
	UMS	50	45	40	35	30	25	23	n/a	n/a	n/a
A334/01	Raw	36	n/a	n/a	n/a	22	18	15	12	9	0
	UMS	34	n/a	n/a	n/a	30	25	20	15	10	0
A334/02	Raw	36	29	24	19	15	13	12	n/a	n/a	n/a
	UMS	50	45	40	35	30	25	23	n/a	n/a	n/a
A335/01	Raw	36	n/a	n/a	n/a	22	18	15	12	9	0
	UMS	34	n/a	n/a	n/a	30	25	20	15	10	0
A335/02	Raw	36	32	26	20	14	11	9	n/a	n/a	n/a
	UMS	50	45	40	35	30	25	23	n/a	n/a	n/a
A336/01	Raw	36	n/a	n/a	n/a	21	17	14	11	8	0
	UMS	34	n/a	n/a	n/a	30	25	20	15	10	0
A336/02	Raw	36	29	23	17	12	8	6	n/a	n/a	n/a
	UMS	50	45	40	35	30	25	23	n/a	n/a	n/a

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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