GCSE

Additional Applied Science A

Twenty First Century Science Suite

General Certificate of Secondary Education **J632**

Examiners' Reports

January 2011

J632/R/11J

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

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

OCR will not enter into any discussion or correspondence in connection with this report.

Any enquiries about publications should be addressed to:

OCR Publications
PO Box 5050
Annesley
NOTTINGHAM
NG15 0DL

Telephone: 0870 770 6622
Facsimile: 01223 552610
E-mail: publications@ocr.org.uk

CONTENTS

General Certificate of Secondary Education

Additional Applied Science A (Twenty First Century) (J632)

EXAMINERS' REPORTS

Chief Examiner's Introduction

Overall, the candidates taking the Additional Applied Science papers in this session performed very well. The papers were constructed to allow candidates to feel that they had every opportunity to demonstrate their knowledge and understanding while at the same time discriminating between candidates of differing abilities. It was intended that candidates should feel that they had a positive experience in taking the examinations.

Most candidates found the papers accessible and demonstrated sound knowledge and understanding of the course content. It was clear that the majority centres had prepared their candidates well. Questions towards the end of the papers were answered equally as well as questions at the beginning of the paper and there was no evidence that candidates ran out of time. Some papers such as 'Communications' showed a significant improvement by candidates when compared to previous years.

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 suite of papers and these are detailed below.

All papers are now marked using an on-line method of marking. These means that papers are scanned before being fed electronically to examiners. Candidates who decide to write outside the designated area, for example adding extra text at the bottom of their scripts are in danger of this worked being missed by the examiner. Candidates should therefore restrict their answers to the space that has been made available.

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 should also pay similar attention to their answers. Answers should always be re-read to ensure that they do indeed answer the question that has been asked.

When answering questions that include numerical calculations, candidates are always asked to show their working. It is vital that they do this. Many 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 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.

Using chemical equations is another area when candidates can lose marks. When candidates are asked for a word equation, as may be required on a foundation paper, it is surprising the number of candidates who write down the chemical equation. This is a risky strategy as to score the marks the chemical equation must be given correctly. Candidates would be well advised to give word equations when they are asked for them in a question.

Basic definitions need to be learned better in order to score relatively easy marks. Many candidates throw marks away by failing to answer simple recall questions. Time would be well spent in teaching candidates basic definitions as this could make a significant improvement to their marks. It would also help candidates to ensure that all deserved marks were credited by spelling all scientific words correctly and ensuring that handwriting is clearly legible.
The individual examiner's reports provide more detail on how candidates performed on specific questions, highlighting areas of concern and applauding improvements from previous years.
All reports are available on line at www.ocr.org.uk

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

General Comments

Overall the candidates performed well with the majority attempting every question, with no indication of any timing issues. Centres had obviously prepared their candidates thoroughly and ensured that they had access to calculators. The paper was able to differentiate clearly between the more and less able students, giving them ample opportunity to demonstrate their understanding in the longer answer questions. Spelling left a lot to be desired, even when copying words from a list.

Comments on Individual Questions

Q 1 The majority of candidates scored all 5 marks for this question, demonstrating a good knowledge of the equipment used to measure various body parameters. A minority had no idea, and chose answers more or less at random. In this case, pus and alcohol were usually suggested as the samples needed to test for signs of diabetes or drugs.

Q 2(a) Only a minority of candidates scored all three marks for labelling the arm bones, despite the provision of a word list to help with the selection. There appeared to be a few centres where candidates either scored all 3 marks, or correctly identified the humerus but mixed up the radius and ulna. However, the vast majority appeared to copy random names from the list.

Q 2(b) The majority of candidates realised that the most appropriate way to examine a broken bone, was to use an x-ray.

Q 2(c) This question was very centre dependent with some candidates well versed in the three functions of the skeleton. These listed protection, support and movement, for an easy 3 marks. A few individuals were less well prepared, and after movement and protection, had to really think to come up with the less obvious answers such as, the site of blood cell synthesis or as a store of calcium. Weaker candidates were either unable to communicate the idea of support, or did not understand the question and answered with a list of assorted bone names.

Q 3(a) The majority of candidates were able to use the scale to successfully draw both bars on the chart. Just a few failed to notice that the scale was 2% to one square.

Q 3(b) This question was very revealing. Well prepared candidates appreciated the concept that the risk of side effects from the MMR jab paled into insignificance alongside the risks of having any of these diseases. A tiny minority realised that the data in the graph was evidence that Josh was at a higher risk of contracting MMR due to the lower uptake of the vaccination in the London area. The remainder either simply repeated the question stem, or had the mistaken belief that Josh would be protected from all diseases for the rest of his life, once he had the vaccination.

Q 3(c) The majority of candidates were able to identify the personal qualities of the nurse and therefore scored full marks for this question. A very small number lost a mark by selecting more than three qualities.

Q 3(d) Although generally well answered, with candidates able to name and describe a range of different health practitioners, there were still a reasonable number who lost at least half the available marks by selecting fitness instructors, or nurses. The latter, despite the question clearly asking for examples other than nurses.

Q 4(a) Overall, this question was answered very poorly with the vast majority of candidates repeating parts of the stem and just saying that the medicine treated the symptoms. Only the really strong candidates were perceptive enough to appreciate that the answer needed to state that the medicines could not cure the flu because they were incapable of killing/destroying the virus.

Q 4(b)(i) A lot of candidates scored both of the available marks for this question with diabetes, pregnancy and kidney infection as the most frequently proffered examples. A few of the weaker individuals misunderstood the term diagnosis and gave the chemical names, such as glucose, sugar or alcohol.

Q 4(b)(ii) This was generally well answered, with most candidates scoring the advantage mark by stating that it was quick and easy. Fewer scored the disadvantage mark, but those who did, gained it for the idea of not being accurate or not being quantitative. The weaker individuals were more concerned with issues of hygiene and discomfort, whilst trying to urinate and use the test stick simultaneously.

Q 5(a) A pleasing number of candidates had access to calculators and were able to substitute the values into the equation and derive the correct BMI. A few scored the substitution mark but then doubled rather than squared the height.

Q 5(b)(i) Once again, the majority identified that Jennie was overweight and scored an easy mark, although a small but surprising number managed to give a wrong answer ranging from obese to just right.

Q 5(b)(ii) This question generally scored at least one of the two available marks. The majority of candidates correctly identified Ronan as overweight and John as underweight, or stated that Ronan should follow a programme designed to lose weight whereas John should have one to gain weight. The better candidates were able to put both of these ideas together and score full marks.

Q 5(c) Most candidates were able to name a parameter which required measuring and a substantial number went on to score the second mark by indicating that it needed to be performed on more than one occasion. Some identified pulse rate and recovery times, but the BMI at the start of the question led most candidates towards weighing or measuring the BMI at regular intervals throughout the training programme.

Q 5(d) This question served to discriminate between the candidates. A number, were able to suggest illness or injury as valid reasons for changing a fitness programme. Some were still distracted by the idea of weight gain or loss and attempted to answer in terms of excessive weight loss or gain. However, a substantial number gave vague answers of too hard or too easy, without attempting to link these statements to the progress or performance of the person undergoing the fitness programme.

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

General Comments

The overall performance of the candidates in the paper was good and almost all candidates were correctly entered for this Higher Tier. The candidates had been well prepared for the examination and were able to demonstrate a good understanding of health care provision. It is encouraging to see that there is an improved understanding and use of correct scientific language and that candidates are also becoming more proficient in their use of mathematical skills. There is now a significant bank of past papers for this specification and many centres appear to be using these to good effect to familiarise candidates with the style and demands of questions set.

As in previous reports, an important message that Centres must pass back to their students is to emphasise the importance of clear handwriting and following the guidance about writing within the framework of the paper as scripts are scanned and marked on-line. There was more evidence of candidates this year not following this advice.

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

Comments on Individual Questions

Q1a This was well answered with candidates being able to substitute into the equation and correctly complete the calculation. A common error was down to careless reading of the question and the wrong person's height being entered into the equation with the correct person's mass.

Q1b Again this was well answered with candidates correctly identifying different needs that justify different fitness programmes

Q1c Candidates often correctly identified a parameter that could be measured but then failed to realise that this measurement has to be compared at the start and end of a training programme/session to see if there has been progress.

Q1d It is expected that a training programme put into place will improve the fitness of an individual and a modification would be needed if the programme were producing a greater (or lesser) degree of progress than expected. Stating that the person had improved is not sufficient to gain a mark.

Q2a Confusing radius and ulna was a common error.

Q2b Very few candidates failed to gain this mark.

Q2c This was well answered with candidates having a good knowledge of the functions of the skeleton.

Q2d(i) Very few candidates failed to gain full marks here.

Q2d(ii) Candidates were well informed on this topic and answered parts (ii) well.

Q3a(i) The most common error here was repeating blood and urine from the stem of the question even though the question asks for two other samples.

Q3a(ii) Candidates need to be careful in their use of terminology when answering a practical based question such as this. A needle (not a syringe) is inserted into a vein. Breaking down the procedure into easy to follow steps allowed candidates to gain most marks in their answer.

Q3a(iii) The question asks for a diagnosis from the blood sample so a measurement such as blood sugar did not gain a mark.

Q3b This was a good discriminating question as it required candidates to write down 3 further features of a national health scheme other than those mentioned in the stem of the question. Some students had clearly covered this information where others were less well informed.

Q4a Again a good discriminating question. Candidates who read the question carefully gained at least one mark for following the instruction to 'use the information in the chart' to show that there was a fall in the number of HIV cases. The better candidates then went on to link this fall with fewer cases of AIDS needing treatment and so less cost to the NHS. A significant number of candidates knew of the ability of public campaigns to raise public awareness so that people were more careful and did not contract HIV.

Q4b Many candidates were aware of poor health services in certain parts of the world and so gained at least one mark. A very common error was a statement saying that a lack of contraception was a problem rather than being specific about the lack of use of condoms to protect against HIV.

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

General Comments

Most candidates performed quite well on this paper and there was clear evidence that they were well prepared for the examination. There was no evidence that any of the candidates ran out of time.

Candidates should be aware that this question paper contains a number of multi-choice style of questions and that with questions of this type, candidates are well advised to at least make an attempt to answer them. They should at least try to eliminate incorrect responses and then take a guess at the correct answer.

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

The paper discriminated well with a mean mark of approximately 19 and candidates distributed across almost the whole range of marks available.

Comments on Individual Questions

1 Part (a) proved to be an easy start to the paper with almost all candidates scoring both of the marks available.

Part (bi) also proved to be straight forward with 80% of candidates giving the correct response. When errors did occur they were randomly distributed across the three remaining incorrect responses.

Part (bii) proved to be slightly more difficult with just over 50% giving the correct answer. Once again, errors were randomly distributed across the three remaining incorrect responses.

As intended, part (bii) proved to be the most testing part of the question. The correct response of checking the quality of the work was only given by just over 40% of candidates. Checking that the equipment was working properly proved to be a powerful incorrect distracter.

2 Part (a) was answered well with most candidates scoring all three marks. Very few candidates failed to score at least one of the three marks available on this question.
In part (bi) most candidates scored both marks for this question. A single mark was available to those candidates who correctly identified 10 x 60 but failed to complete a correct calculation. Most correctly measured the length of A to B and then converted this scale into an actual distance.

Candidates found part (bii) more difficult but many went on to correctly calculate the area in square metres.

Almost 1% of candidates failed to attempt to answer either part (i) or part (ii) of this question.

3 Only the most able candidates scored all three marks in part (a). All too often candidates simply listed items from the help list provided in the question. This resulted in no marks being awarded. Credit was given for correctly stating what was done at each step in the procedure and putting the three steps in the correct order. Good answers included "Putting the blood on the slide. Adding staining reagent and finally adding a cover slip".

Part (b) was an old favourite but asked in a rather different way. In the past candidates have been asked to calculate the magnification of a microscope having been given the magnifying power of two lenses. This information was not provided on this occasion and candidates were asked to explain how they would do it. This made the question much more difficult. Less than 30% of candidates scored both of the marks available. Common errors included "multiplying the microscope by the lens" or simply "adjusting the magnification". One mark was awarded for any reference to multiplying two numbers together and the second mark for stating that it was the magnification of each lens that should be multiplied together.

Approximately 55% of candidates correctly answered for part (c) that light microscopes increase the resolution of the image. A common misconception was that the microscope moved the image closer to the eye.

4 Approximately 60% of candidates were able to identify A as being an electron in part (a).

In part (b) most candidates realised that an electron microscope could not be used to view living material and in part (c) that they gave greater magnification than light microscopes.

5 Part (a) was made more difficult by the fact that candidates were not told how many correct responses were required. Just over half the candidates realised that both A and B were required to be credited with the single mark.

Just over half the candidates also correctly identified the mobile phase and the stationary phase as the correct responses for parts (b) and (c).

Part (d) proved to be a more difficult question with only 30% of candidates giving the correct response of "the dye moves between the two phases". A common error was that candidates simply thought that the dye just moves up the paper.

Part (e) proved to be very difficult. Only the most able candidates, about 5% of candidates, gave answers that included the idea of comparing or matching in order to identify the unknown example.

6 Part (a) was also not answered particularly well. The answer was unusual in that it required three horizontal lines and it was clear that many candidates thought that this was too straightforward to be the correct response. Consequently only 10% of candidates scored both of the two marks available.

Less than 30% of candidates managed to obtain the mark in part (b). What should have been an easy answer was made more difficult by the context. Candidates need more training to be able to transfer skills learnt in one situation to a new and novel context. Part (c) was another question that should have provided two easy marks. Instead an easy opportunity was thrown away by most candidates because they could not remember a simple colour testing kit such as clinistix or pregnancy testing.

Part (d) clearly divided candidates into two groups. Some candidates have no difficulty in plotting graphs and interpreting them. Other candidates find the process almost impossible. This is a skill that candidates need to practice until they can get it right. Simple marks were thrown away because candidates either failed to plot all the points correctly or then could not draw a line of best fit from the origin through most of the plotted points.

In part (iv) any error made in drawing the line was carried forward so that candidates could be credited for reading a graph and not penalised for the same mistake twice.

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

General Comments

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.

Comments on Individual Questions

1a Most candidates had a good idea of the appropriate organisations or people but many struggled to recall the names.

1bi/ii/iii The importance of accreditation to ensure reliability and the increase in reliability produced by using a system of common practice and procedures were both well known by most candidates. The purpose of proficiency tests to check quality of their work was less well known with checking equipment being a common misconception

2a Most understood that they were being asked for information that could be seen in the photograph. A small minority did not, and wrote things like 'make a sketch of...' or 'question the witnesses'. Some candidates focussed too much on one aspect to score all the marks e.g. details of the cars (number plate, colour, damage to the roof). A few candidates referred to observations which could not be seen in the photograph such as injuries to drivers or the speed the cars were travelling at.

2bi Very few candidates were unable to calculate the length of damaged section from their measurement and a correct use of the scale given

2bii Again, most candidates correctly calculated the area of the damaged area as being 1800m2 from the given dimensions. A small number calculated the perimeter instead.

2biii The idea of an increase in uncertainty on multiplication was again not well understood and only the best candidates scored here. Many candidates talked about the area of damage not being straight lines or made vague comments about the whole area not being damaged and evidence being found outside the area. Of those who did appreciate that the question was about uncertainty in the measurements, most gained the mark for the idea of multiplication with few correct answers for the uncertainties in measurement point. Many candidates assumed that the lengths were 'wrong' or had been 'measured incorrectly'.

3a Most candidates identified at least 2 of the 3 steps in the standard procedure to prepare a temporary microscope slide or identified 3 steps but in the wrong order. The role of the staining agent was the least well understood with some thinking it was used to clean the slide.

3b Many candidates knew they had to multiply something to find the magnifying power of the microscope, although some were confused about what was being multiplied often describing the multiplication of the lenses. There were some good answers that correctly identified the 2 lenses and recalled them by name. Some candidates referred to focussing rather than magnification and others thought that all the available lenses should be multiplied together.

4a Many candidates struggled to calculate the range of values which the purity of the drug lay between. Common incorrect values given were 99.1% and 0.2% but a wide range of incorrect values were seen

4b Few candidates understood the meaning of the terms systematic and random errors. 'A mistake made by a machine/the system' and 'a mistake made by a scientist' were typical answers.

5a Most candidates were able to choose the two advantages of gas chromatography over paper chromatography.

5b Candidates found it difficult to clearly identify the differences between paper and gas chromatography with many just using the titles e.g. 'one uses paper and the other gas.' The best answers compared the type of result obtained or the mobile phase used.

6a Few candidates could name examples of all 3 types of colour testing. The correct choice of colorimetry as a quantitative test was the most common scoring point. Some lost marks for answers which need not involve colour such as 'pH testing' as an example of a semi quantitative test. There were many references to chromatography and some misunderstood the question and described the meaning of the terms rather than giving examples.

6bi Many candidates are still getting the axes of this calibration graph the wrong way round, and far too many do not use linear scales. Some multiplied the values given by 100 for no apparent reason. The quality of points plotted was very variable.

6bii The majority of candidates drew a good line of best fit but there were still too many who drew the line by hand or did not take it through the origin.

6biii Most candidates correctly identified the concentration of the unknown from the given absorbance but many did not include the correct units needed for the mark to be awarded.

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

General Comments

It was good to see that the majority of candidates felt able to answer all of the questions.

Marks earned ranged from 31 to 8, out of a total of 36. As in previous sessions, weak candidates earn most of their marks with the objective questions, and struggle to provide sensible answers to questions which require them to express themselves in full sentences.

Candidates are increasingly poor at recalling facts and their ability to operate with numbers has not improved.

Comments on Individual Questions

1 This question was about the use of radio transmitters by the police. The vast majority of candidates were able to correctly match the hazard signs in the workshop to their names, and most were able to give a good reason for running a transmitter from mains electricity. All candidates seemed to be guessing the correct safety feature, with only one third of candidates over the whole ability range earning the mark . Only the weakest candidates confused encryption with compression, and about half of the other candidates were able to give another example of an encrypted communication system. Most candidates earned at least one mark for completing the block diagram of the radio transmitter, possibly because the word loudspeaker was not one of the ones to choose from, helping candidates to not confuse the system with a receiver! Although most candidates knew that an amplifier increases the amplitude of a signal, only a minority could use the word encode to describe the action of a modulator - transmit was a very popular wrong answer.

2 It was good to find that the majority of candidates scored most of the marks for this question about long-distance communication systems. Weak candidates had difficulty in classifying sub-systems as links or outputs, but usually had no difficulty in describing their own example of a long-distance communication system (usually the internet) and explaining the difference it made to their lives.

3 This question about radio receivers discriminated well across the ability range, with weak candidates throwing away marks that strong candidates earned with ease. Few candidates earned all three marks for matching each component part to its function, but equally few failed to earn less than one. The functions of aerial and tuner were often confused with each other, but nearly all candidates knew what a loudspeaker does. Although the majority of candidates knew that using batteries allows equipment to be portable, too many weak candidates thought that it improved the performance. Candidates who answered the question of the last part usually earned at least one mark, but a significant number of weak candidates answered a completely different question and explained the advantages of encryption instead.

4 Although most candidates knew that pictures are made of pixels, they were often less sure about their arrangement in rows to make frames. Only a small minority of bright candidates were able to divide the number of bits by 8 to express the information in bytes.

5 This was the first of two questions which also appeared on the higher tier paper. As such they were targeted at candidates operating at grade D or above, so proved to be more difficult than the previous four questions. Although some candidates declined to identify the LED in the circuit, many were able to do so without getting it confused with the LDR. Only a minority of candidates suggested using a voltmeter (or even just a meter) to measure the voltage across the resistor - many suggested calculating it from the current and the resistance instead. Perhaps they hadn't used a voltmeter enough as part of their practical work? Less than half of the candidates could calculate the current, with many preferring to divide the resistance by the voltage instead. It was good to find that half of the candidates knew that components are damaged by heating when run close to their maximum power ratings. Few candidates still have no idea why programmable circuits are generally cheaper to implement.

6 This question about satellite TV systems also discriminated well, with weak candidates struggling to earn marks. Most candidates recognised that the camera and microphone were inputs to the editing suite, but only a minority put the receiver and transmitter in the correct order as well. Weak candidates struggled to describe what editors do, with many relying too much on the word edit or describing functions that a technician would perform. Many candidates were able to describe a dish aerial, but few could identify the radio frequency used to communicate with a satellite.

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

General Comments

It was good to see that the majority of candidates felt not only able to answer all of the questions, but were also able to produce sensible answers to them. Centres are to be congratulated on preparing their candidates properly for this paper.

Marks earned ranged from 34 to 4, out of a total of 36, with the vast majority of candidates correctly entered for this tier.

Comments on Individual Questions

1 This was the first of two questions which also appeared on the foundation tier paper. As such they were targeted at candidates operating at grade C or below, so proved to be easier than the last four questions of the paper. Most candidates were able to identify the LED in the circuit. Although most candidates suggested using a voltmeter (or even just a meter) to measure the voltage across the resistor, only a minority were able to describe how it should be used - a correct drawing on the circuit diagram was acceptable. Most candidates were able to correctly calculate the current in the resistor and explain the damage that could be caused if the heating power exceeded the power rating of the device. Only the strongest candidates were able to explain why programmable circuits confer an economic advantage.

2 This question about satellite TV systems was well answered by most candidates. Only the weakest candidates failed to select the camera and microphone as the inputs for the editing suite and get the transmitter and receiver round the wrong way. Although most candidates elected to use a dish aerial to communicate with the satellite, only the strongest remembered the correct frequency to use.

3 This question was harder than the previous two, mainly because none of the answers were objective. So candidates lost marks by being imprecise, vague or wrong in their meanings of the hazard symbols. Earth leakage devices were, in general, poorly understood. Weak candidates confused them with hot-wire fuses, but the majority of candidates declared correctly that they switched off the mains power automatically when things went wrong. Although many candidates could correctly complete the block diagram, very few were able, as expected, to correctly describe the function of the modulator or correctly identify the type of modulation being used.

4 This question about radio receivers required free response answers from candidates, and therefore proved to be especially difficult for weak candidates. Few candidates could clearly describe the function of aerial and tuner, but had more success in explaining compression and its advantages.

5 This question was objective, so more accessible to weaker candidates. However, many struggled with the block diagram, often inserting words (such as microphone, amplifier and loudspeaker) that were not in the original list. Similarly, only strong candidates were able to securely identify the optical fibre as a link rather than a processor or output.

6 The first part of this question required candidates to explain how video presents pictures on screen via pixels, rows and frames. Good candidates structured their answer carefully, ensuring that they explained the meaning of each term separately. Weak candidates often took the meaning of pixel for granted, thereby losing a mark. Few candidates were able to correctly calculate the video bit rate from the information provided, but the use of error-carried-forward allowed many of those brave enough to attempt the calculation a mark for successfully converting their incorrect answer into bytes.

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

General Comments

The entry numbers were slightly down on previous sessions. The general performance was also slightly lower.
The main problems were due to:

- not reading the question. For example Q1a asked the candidate to identify characteristics for the "perfect milk producing cow" but many candidates misread it and selected muscular body/ soft skin/ needs high quality grass.
- not putting the correct number of ticks. For example Q1cii) and Q2a both required 2 ticks but many candidates only ticked one box.
- lack of knowledge. For example Q2f required knowledge and understanding about how to work out the crop yield using the wet mass method. Very few candidates wrote a sensible answer.
- lack of mathematical skill. For example Q3bi required a percentage calculation. Only about 20% could do so.

Candidates produced good performances in

- sequencing stages in selective breeding
- knowing advantages of artificial insemination
- understanding pH values
- knowing a gathered and a whole organism harvest.

Comments on Individual Questions

Question 1

This question was based on selective breeding and artificial insemination and involved ticking boxes and writing in selected words. It was quite well answered by the majority of candidates.
a) Although this seemed a straight forward question on selecting characteristics for a milk producing cow, many candidates seemed to misread the question and selected general characteristics such as muscular body.

b) The majority of candidates scored well in selecting the correct sequence of stages in selective breeding.

c) i) About half the candidates selected the correct sequence of sexual reproduction.

c) ii) About 60% of candidates selected two correct advantages of artificial insemination. The "time of birth can be planned" was usually the one correct answer not selected.

d) This question on transplanting embryos was answered very well with about 80% of candidates scoring 4 marks.

Question 2

This question was based on growing radishes. It showed a good spread of marks.

a) Only about 30% of candidates correctly identified two conditions for germination. The majority of candidates believed that carbon dioxide was necessary.

b) Most candidates understood why the radishes would not grow well in the compost.

c) Many candidates seemed confused with this general question on plants growing in compost and linked it to the previous question about radishes.

d) It was surprising to note that only about 20% of candidates gained two marks. Candidates did not take care when looking at the diagram and assumed it was a greenhouse. Many answers quoted "temperature control". A common misconception was that glass increased the amount of light reaching the plants.

e) The majority of candidates correctly identified the description of an insecticide.

f) It was obvious that candidates had virtually no knowledge or understanding of measuring crop yield. About 70% of candidates scored zero marks out of a possible three marks.

Question 3

This question was based on the life cycle of plants and the fermentation of honey. It was targeted at Grades D/C and was also on the Higher Tier examination paper.

a) About half the candidates correctly identified the sequence of stages in the life cycle.

b) i) The attempts at calculating the percentage of the value of honey bee pollination was very disappointing, with only about 20% of candidates scoring two marks. Most answers showed apparently random attempts to add/ subtract/ divide or multiply some numbers.

b) ii) It was surprising to note that a significant number of candidates gave reverse answers when selecting the most and least affected crops.

c) i) This question on writing down a word equation for anaerobic respiration showed an almost complete lack of knowledge, with only about 5% of candidates scoring two marks.

c)ii/iii/iv) Most candidates made a reasonable attempt to explain stages in the process of fermentation. However, as in previous years, candidates are not very good at selecting qualitative or quantitative methods.

Question 4

This question was based on farming sheep with little wool. It was targeted at Grades D/C and was also on the Higher Tier examination paper.

a) i) Many candidates wrote vague answers or simply repeated the question. A realisation that ticks and fleas would not attach themselves to a thin fleece was required.

a) ii) Again, many candidates found it difficult to clearly express themselves. Two answers were required to gain the mark; only about 10% of candidates did so.

b) i) Most candidates were able to state a gathered and a whole organism harvest.

b) ii) It was surprising to note that only about 10% of candidates could name a supporting organisation and explain what the support was, especially since this has been a common question in previous examinations. The majority of answers referred to regulatory organisations such as the FSA not supporting organisations.

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

General Comments

The entry and performance was similar to previous January examination sessions. There was a wide mark range, from 1 mark to 29.
Problems encountered by candidates were due to:

- inappropriate entry for the Higher Tier shown by a considerable number of candidates scoring less than ten marks out of a possible 36. It would not have been a pleasant experience for these candidates.
- poor mathematical skills shown by the number of candidates being able to calculate a percentage.
- lack of knowledge in many areas such as anaerobic respiration, hormone treatment in cattle and tissue culture.

Candidates produced good performances in

- explaining stages in the fermentation diagram
- describing artificial insemination
- recalling limiting factors in photosynthesis.

Comments on Individual Questions

Question 1

This question was based on the life cycle of a flowering plant and fermentation of honey. It was also in the Foundation Tier examination and targeted at Grades D/C.
There was a good spread of marks from 1 to 10 out of 11 available marks.

a) About 50% of candidates were able to identify the correct sequence in a plant's life cycle.

b) i) Only about 45% of candidates were able to calculate the percentage of the crop. Many answers seemed to be just random attempts at adding/dividing/subtracting/multiplying numbers.

b) ii) Interpreting the information to work out the highest and lowest yields caused few problems.

c) i) It was surprising to note that only about 20% of candidates knew the word equation for anaerobic respiration.

c) ii/iii) Explaining steps shown in the fermentation of honey was well done.

c) iv) Most candidates were able to identify the correct qualitative stage of fermentation.

c) v) The question was not in the Foundation paper. Candidates were asked why adding extra sugar to the mead could be dangerous. Only about 10% of candidates could apply their knowledge and realise that fermentation could continue, resulting in the production of more carbon dioxide and burst bottles.

Question 2

This question was based on Easy care sheep, i.e. sheep with little wool. It was also in the Foundation Tier examination and targeted at Grades D/C.
There was a good spread of marks, from 0 to 9 out of 10 possible marks.

a) ii) Candidates were asked to describe two other advantages (apart from few ticks/ fleas) of keeping these sheep. Unfortunately most candidates quoted fewer ticks/ fleas in their answer. Only about 30% of candidates scored a mark.

a) ii) Few candidates (about 20%) realised that these sheep would suffer in cold conditions and would need to be kept in sheltered areas or indoors.

b) i) As in Foundation level, many candidates identified regulatory organisations such as the FSA rather than the requested supporting organisations such as the British Potato Council.

b) ii) Many candidates wrote vague descriptions of the advantages of artificial insemination. These included "avoids diseases" instead of "prevents sexually transmitted diseases"; and "don't need a bull" instead of "don't need to keep a bull".

b) iii)The process of artificial insemination was well known.

Question 3

This question was based on embryo transplantation in cattle and the candidates were supplied with a series of diagrams.
There was a good spread of marks, from 0 to the maximum of 6 marks.

a) i) The majority of candidates knew that hormones were used to prepare the cow.

a) ii) Despite knowing that hormones were involved, very few candidates could describe what they did i.e. control the release of many eggs.

b) The majority of candidates knew that the embryos would develop in the uterus.

c) Many candidates seemed uncertain how to answer this question about the desired characteristics of a surrogate cow (such as high milk yield, no problems with previous births, healthy) and wrote vague, rambling answers.

Question 4

This question was based on tissue culture.
There was a good spread of marks, from 0 to 7 out of a possible 9 marks.

a) Very few candidates could offer any relevant information about how tissue culture was done. Candidates were expected to know that any plant cells, particularly meristems could be used, that conditions had to be sterile and that the new plants were grown in agar containing nutrients and growth hormones.

b) i) Surprisingly, only about 10% of candidates could give a good explanation as to why the new plants were identical. Candidates were expected to know that the new plants were from the same plant/ source, that they had the same genes/ DNA, because sexual reproduction had not taken place.

b) ii) About half the candidates realised that cuttings/budding/ grafting were other methods that could be used.

c) i) ii) The majority of candidates named two correct limiting factors in photosynthesis, but very few could explain what was mean by a limiting factor.

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

General Comments

The paper gave a good distribution of marks allowing the better candidates to score well and other candidates to show what they knew.

The persistent problem with calculation questions was again shown, despite the formula being given as help. It would appear that candidates need to be reminded again to take calculators into the exam room to give them more confidence in such questions.

Not much writing was required on the paper but it was still clear that many candidates struggled in expressing their answers to varying degrees and especially found the use of technical terms, chemical names and some other words
difficult.

Centres are hard pressed to do enough practical work, but it would help the candidates' responses if they were more familiar with the basic equipment and methods needed to carry out standard procedures in the lab. At least candidates need to be able to recognise and understand the use of each piece of basic kit.

Comments on Individual Questions

1) Many candidates did well on this question which was designed to test recognition and use of common apparatus. All of the pieces should have been used frequently during the course but it was clear from the answers that not all Centres have been able to do this.
2) Candidates did well on this question generally. It was designed to look at product development, chemical formulae and production systems commonly used by industry. It was pleasing to see that so many Centres had covered these areas well as the candidates showed good understanding of the processes and were much better with the formula question than on previous papers. Perhaps more care should be used when completing the lines that join the boxes in questions like this.
3) This question was about health and safety. Hazard warning signs seem to be pretty well known and it is hoped that the candidates see and use them regularly during the normal course of lessons. Reasons for regulations were not well explained by the candidates mainly due to their inability to express what they know in writing. Environmental impact reduction, safety of the public and protection of the handlers were the sort of reasons needed to score well. Surprisingly, very few candidates seemed to know about the Health and Safety Executive (HSE).
4) What happens during chemical reactions proved to be a tough question topic for most candidates. The idea of rate was poorly understood, with most just simply talking about time without relating it to what was happening in the reaction (reactants changed to products etc.). Completion of the formula boxes was not done well even though three of the four names required were given in the stem of the question. The reaction between an acid and a metal to give a salt and hydrogen should have been a familiar one to the candidates that they ought to have done for themselves during the course. Exothermic evolution of heat energy during a reaction was reasonably well known, but many candidates failed to recognise that to demonstrate this they needed to show something like a temperature increase during the course of the reaction. Merely stating that a thermometer should be used was not enough.

5) Another question on industrial production, but this time about sources of materials, quality control and methods. What inorganic means was well known and most could do the simple maths involved with the pie chart. More difficulty was found when trying to explain the reasons for product testing before sale to the public. Ideas about safety of the public, consistency of the product etc were required.
6) This question was designed to test the candidate's knowledge of basic practical procedures. The preparation of an aqueous solution of sodium chloride is a standard practical procedure that the candidates should know, but any soluble salt could have been used as the question was about the process. This seems to be an area of weakness as very few knew how to do this properly to ensure that the salt was made up accurately. Few also knew how to transfer the solution into the graduated flask correctly, often giving irrelevant information. All that was required was to pour the solution through a funnel (not a filter) and to use a glass rod to pour down to avoid splashes. The definitions of solute and solvent need to be learned. The final calculation, using the formula given, only required the conversion of 100 ml into litres (0.1 litres) and a substitution into the formula.

1) Many candidates did well on this question which was designed to test recognition and use of common apparatus. All of the pieces should have been used frequently during the course but it was clear from the answers that not all Centres have been able to do this.
2) Candidates did well on this question generally. It was designed to look at product development, chemical formulae and production systems commonly used by industry. It was pleasing to see that so many Centres had covered these areas well as the candidates showed good understanding of the processes and were much better with the formula question than on previous papers. Perhaps more care should be used when completing the lines that join the boxes in questions like this.
3) This question was about health and safety. Hazard warning signs seem to be pretty well known and it is hoped that the candidates see and use them regularly during the normal course of lessons. Reasons for regulations were not well explained by the candidates mainly due to their inability to express what they know in writing. Environmental impact reduction, safety of the public and protection of the handlers were the sort of reasons needed to score well. Surprisingly, very few candidates seemed to know about the Health and Safety Executive (HSE).
4) What happens during chemical reactions proved to be a tough question topic for most candidates. The idea of rate was poorly understood, with most just simply talking about time without relating it to what was happening in the reaction (reactants changed to products etc.). Completion of the formula boxes was not done well even though three of the four names required were given in the stem of the question. The reaction between an acid and a metal to give a salt and hydrogen should have been a familiar one to the candidates. Exothermic evolution of heat energy during a reaction was reasonably well known, but many candidates failed to recognise that to demonstrate this, they needed to show something like a temperature increase during the course of the reaction. Merely stating that a thermometer should be used was not enough.
5) Another question on industrial production, but this time about sources of materials, quality control and methods. What inorganic means was well known and most candidates could do the simple maths involved with the pie chart. More difficulty was found when trying to explain the reasons for product testing before sale to the public. Ideas about safety of the public, consistency of the product, etc..were required.
6) This question was designed to test the candidates knowledge of basic practical procedures. The preparation of an aqueous solution of sodium chloride is a standard practical procedure that the candidates should know, but any soluble salt could have been used as the question was about the process. This seems to be an area of weakness as very few knew how to do this properly to ensure that the salt was made up accurately. Few also knew how to transfer the solution into the graduated flask correctly, often giving irrelevant information. All that was required was to pour the solution through a funnel (not a filter) and to use a glass rod to pour down to avoid splashes. The definitions of solute and solvent need to be learned. The final calculation, using the formula given, only required the conversion of 100 ml into litres (0.1 litres) and a substitution into the formula.

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

General Comments

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

Comments on Individual Questions

Q1 Part (a) was attempted by most candidates with very few failing to score. However, the sequences given often indicated that many candidates were not familiar with these descriptions of the processes involved in making up standard solution.
In part (b) the question was seeking an appreciation that a solution might be poured down a glass rod &/or through a funnel to avoid spillage. The use of a glass rod was rarely seen and the easier mark was often missed because the process was described as "filtering". A number of weaker candidates answered in terms of how to minimise or clear up the mess when they had spilled something. In parts (c) and (d), the terms solute and solvent were reversed surprisingly often, but were generally well known. Most candidates failed to score in part (e), often calculating g/ml rather than g/l.

Q2 The term "rate of reaction" in part (a) was not well understood with most candidates simply stating that it meant "how fast" the reaction is. The concept of an amount of substance used or made was sometimes credited to candidates who referred to a reaction being complete - but "time" was rarely used correctly.
In part (b)(i), many better candidates knew that hydrogen was produced in this reaction, but the common use of marble chips in such experiments meant that some candidates expected carbon dioxide to be collected. Magnesium chloride was a common response as well.
Candidates were clearly not used to drawing apparatus as required in part (b)(ii). Only 10% of candidates drew apparatus which was plausible. Most who did attempt the task sketched apparatus which made no concessions to the build-up of pressure inside sealed apparatus.
Most candidates knew that the higher temperature in part (c) would produce a steeper curve, but only a small number showed the same final volume on their graph. In part (d), most candidates were aware that a catalyst would change the rate of a reaction, but relatively few went on to score the second mark.

Q3 The symbol equation in part (a) was very poorly done, even though all the chemicals needed were named in the stem and all the formulae are explicitly required in the specification. Fewer than 10% of candidates scored any marks on this part.
Part (b) was attempted effectively by more than half of the candidates, a distinct improvement from previous papers. However, some candidates still tended to confuse the colour changes in wide-range indicators with the pH that they represent. The calculation of relative formula mass in part (c) was often completed correctly with very few arithmetic errors. The commonest misunderstanding was to use one atom of each element giving the answer 71.
The meaning of the word soluble was well known in part (d)(i) but crystallisation was usually poorly explained in the last part of this question. Candidates often invented their own question, describing instead how the speed of formation affects the size of the crystals.

Q4 Although the meaning of the word "organic" is given in the specification in terms of living or once-lived sources, many candidates chose to answer part (a) in terms which clearly related to the advertising of food: e.g. "natural", "no additives" or "not man-made". A pleasing majority of candidates could recognise the hydrocarbon and many also knew the carboxylic acid in part (b). A predictably low number of candidates knew the name of the ester which was made in part (c), but many salvaged a mark by remembering that water would be the other product. Some of the better candidates gave the two correct responses in part (d), but a random selection from the word list was more common. Part (e) was found to be very challenging. Some candidates seemed to understand the disadvantages of a process which has to be stopped and re-started, but few could give an advantage.

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

General Comments

Candidates' performance on this paper was generally in line with previous sessions. There were very few blank scripts and no candidates appeared to be penalised by lack of time. It was apparent that some centres had prepared candidates well for questions where a previously rehearsed answer was required (such as Q4a) whereas others had not. It was also apparent that some candidates, having practised past question papers, responded with their practice answer even where the question was a different one. It was a little disappointing that many candidates were unable to provide evidence that they had performed the experiments alluded to in Q1 and Q6, although most did at least refer to the correct area of physics.

Comments on Individual Questions

1)
- a) The experiment to determine tensile strength is not well known to candidates. There were many examples of testing samples in bend tests or as cantilevers, all of which, with the correct and complex analysis could lead to a determination of tensile strength. However, they did not explicitly provide the correct data for a simple test. It is reassuring to see candidates reporting on experiments that they evidently have seen or performed in class. However, the relationships of these experiments to the fundamental materials property needs to be understood. Encouragingly, there were few examples of candidates describing 'thermal' expansion' or conduction experiments, although there was a plentiful supply of 'compression' tests.
- b) Few candidates recognised that the glass needs to be strong 'in tension'.
- c) many candidates used 'fibre glass' as their second composite. We have become used to candidates using shorthand of 'glass fibre' or 'carbon fibre', but this obviously leads to a misunderstanding of the true nature of the composite involved. Diagrams were absent or poorly done in many cases. Often the diagram was of a 'use' rather than the structure; for example drawing a F1 car rather than the 'structure' of carbon fibres in a resin matrix. The one exception was when candidates described reinforced concrete, which was often clearly illustrated.

2)
- a) Few candidates identified the correct responses, with 'unreal' and 'not inverted' being common answers. These are specification terms and should be known.
- b) Most candidates could provide an answer, but a significant number provided neither a 'use' nor a 'reason why needed'. In the absence of these, zero marks were often awarded for what initially appeared to be good answers.

3)
- a) A comparison of thermal conductivities was required, and many candidates just described one component.
- b) Whether candidates knew this response or not seemed to be a centre issue, with many clear, correct answers and many other irrelevant responses.
- c) Graphs were generally well plotted, although the rather awkward scale defeated some candidates. Most responses made at least an attempt to draw a smooth curve, which was credited.

4)
- a) This question is a direct reference to the specification statement that requires candidates to know two examples of materials used for their 'matching mechanical properties'. It was very poorly answered, with most candidates simply describing why a single material was used for a particular purpose. This gained no marks. Other responses referred to thermal or electrical properties, which also gained zero.

5)
   a) Where candidates did not recognise that momentum was involved, the responses were often simply 'time' or 'force'.
   b) It was disappointing to see a few candidates, failing to respond to earlier questions, also not identifying that they could at least 'guess' answers here and leaving the grid blank instead.
   c) Very few correct answers were seen. It was particularly disappointing to find vey few candidates who could identify Newtons as the appropriate unit.

6) Much of this question relied on a correct reading of the text. Many answers to the first two parts seemed to relate to the cables rather than the spacers. Perhaps candidates are tiring by the time they reach this last question? Where insulating properties were identified, they were often attributed to specific materials rather than a 'class'. 'High' and 'middle' class were seen. It was alarming to find that many candidates could draw the circuit for part c without including either a test sample or a power supply. Without these no marks were possible. It is still very evident that candidates are confused about the role of voltmeters and ammeters. It was not possible to gain the final mark by simply restating the formula in the question. The terms in G=I/V did need some translation, and where they were, a surprising number of candidates got them wrong.

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

General Comments

Candidates' performance on this paper was generally in line with previous sessions. There were very few blank scripts and no candidates appeared to be penalised by lack of time. It was apparent that some centres had prepared candidates well for questions where a previously rehearsed answer was required (such as Q4a) whereas others had not. It was also apparent that some candidates, having practised past question papers, responded with their practice answer even where the question was a different one. It was a little disappointing that many candidates were unable to provide evidence that they had performed the experiments alluded to in Q1 and Q6, although most did at least refer to the correct area of physics.

Comments on Individual Questions

1)

a) The experiment to determine tensile strength is not well known to candidates. There were many examples of testing samples in bend tests or as cantilevers, all of which, with the correct and complex analysis could lead to a determination of tensile strength. However, they did not explicitly provide the correct data for a simple test. It is reassuring to see candidates reporting on experiments that they evidently have seen or performed in class. However, the relationships of these experiments to the fundamental materials property needs to be understood. Encouragingly, there were few examples of candidates describing 'thermal' expansion' or conduction experiments, although a plentiful supply of 'compression' tests.

b) Few candidates recognised that the glass needs to be strong 'in tension'.

c) many candidates used 'fibre glass' as their second composite. We have become used to candidates using a shorthand of 'glass fibre' or 'carbon fibre', but this obviously leads to a misunderstanding of the true nature of the composite involved. Diagrams were absent or poorly done in many cases. Often the diagram was of a 'use' rather than the structure; for example drawing a F1 car rather than the 'structure' of carbon fibres in a resin matrix. The one exception was when candidates described reinforced concrete, which was often clearly illustrated.

2)

a) Few candidates identified the correct responses, with 'unreal' and 'not inverted' being common answers. These are specification terms and should be known.

b) Most candidates could provide an answer, but a significant number provided neither a 'use' nor a 'reason why needed'. In the absence of these, zero marks were often awarded for what initially appeared to be good answers.

3)

a) A comparison of thermal conductivities was required, and many candidates just described one component.

b) -

c) Whether candidates knew this response or not seemed to be a centre issue, with many clear, correct answers and many other irrelevant responses

d) Graphs were generally well plotted, although the rather awkward scale defeated some candidates. Most responses made at least an attempt to draw a smooth curve, which was credited.

4)

a) This question is a direct reference to the specification statement that requires candidates to know two examples of materials used for their 'matching mechanical properties'. It was very poorly answered, with most candidates simply describing why a single material was used for a particular purpose. This gained no marks. Other responses referred to thermal or electrical properties, which also gained zero.

5)
   a) Where candidates did not recognise that momentum was involved, the responses were often simply 'time' or 'force'.
   b) It was disappointing to see a few candidates, failing to respond to earlier questions, also not identifying that they could at least 'guess' answers here and leaving the grid blank instead.
   c) Very few correct answers were seen. It was particularly disappointing to find vey few candidates who could identify Newtons as the appropriate unit.

6) Much of this question relied on a correct reading of the text. Many answers to the first two parts seemed to relate to the cables rather than the spacers. Perhaps candidates are tiring by the time they reach this last question? Where insulating properties were identified, they were often attributed to specific materials rather than a 'class'. 'High' and 'middle' class were seen. It was alarming to find that many candidates could draw the circuit for part c without including either a test sample or a power supply. Without these no marks were possible. It is still very evident that candidates are confused about the role of voltmeters and ammeters. It was not possible to gain the final mark by simply restating the formula in the question. The terms in G=I/V did need some translation, and where they were, a surprising number of candidates got them wrong.

OCR (Oxford Cambridge and RSA Examinations)
1 Hills Road
Cambridge
CB1 2EU

OCR Customer Contact Centre

14 – 19 Qualifications (General)
Telephone: 01223 553998
Facsimile: 01223 552627
Email: general.qualifications@ocr.org.uk

www.ocr.org.uk

For staff training purposes and as part of our quality assurance programme your call may be recorded or monitored

OCR (Oxford Cambridge and RSA Examinations)
Head office
Telephone: 01223 552552
Facsimile: 01223 552553