

Additional Applied Science A

Twenty First Century Science Suite

General Certificate of Secondary Education **GCSE J632**

Reports on the Units

January 2010

J632/MS/R/10J

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

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

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Chief Examiner's Report

Intro to PE Reports J632 – Additional Applied – Jan 2010

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 provide discrimination between candidates of differing abilities. It was intended that candidates should feel that they had a positive experience in taking the examinations.

Most candidates found the papers accessible and demonstrated 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.

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

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

When answering questions that include numerical calculations, candidates are always asked to show their working. It is vital that they do this. Candidates are very good at answering calculation questions intuitively or performing simple mental arithmetic and then writing down the answer. Providing the answer is correct, this is not a problem as they will gain full marks. However it is a very risky strategy. A simple mistake in their mental calculations will lose 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, 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.

Standard procedures also need to be practiced more by Centres, enabling candidates to become more familiar with the methods of working.

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.

The following reports provide more detail on how candidates performed on specific questions, highlighting areas of concern and applauding improvements from previous years. Please ensure that your staff are encouraged to read these reports. They are available on line at www.ocr.org.uk

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

General Comments

The paper performed well with most students able to gain marks for the tick boxes and the more able to demonstrate their understanding in the longer answer questions. There was no evidence of any candidates having insufficient time to complete the paper and generally speaking the candidates were able to demonstrate a good understanding of health care provision.

Comments on Individual Questions

- 1(a)** The vast majority of candidates gained full marks for this question with very few students mixing blood pressure and body mass.
- 1(b)** This proved to be a good discriminator. Most students were able to access one mark for shivering, goose bumps or hairs standing on end, but very few candidates were aware of vasoconstriction. Quite a number expected Jason to turn pale – although far more anticipated colour changes ranging through the visible spectrum from blue to red. A worrying minority of candidates expected Jason to start sweating and there were some students who misinterpreted the question and talked about Jason developing hypothermia or a cold / flu.
- 2(a)** This was very centre dependent with some centres scoring two or three marks on every script whereas other centres appeared to have allocated the labels in a more or less random fashion.
- 2(bi)** This question was generally well answered, with the majority suggesting the use of an X-ray. A few candidates were too vague and suggested using a scan, and some seemed to associated “non-invasive” with “non-medical” and resorted to physiotherapy, manipulation and massage. There were also a relatively small number of candidates who did not attempt to answer this question, which might suggest that they did not recognise the term “non-invasive”.
- 2(bii)** Only the most able scored both marks for this question. Many scored one mark with a generalised assertion that it was safer or less risky – but very few explained how/why the risk was minimised. The candidates who had used non-medical interventions in the previous question often then stressed the potential hazards involved with using X-rays and other types of scan. Likewise, a number of candidates simply left the answer blank.
- 2(c)** This was poorly answered by the majority of students as they ignored the idea that all treatments carry a risk. Many students were too vague and wrote ‘it might not work’, or ‘she may not be able to walk’. Only a very small number were able to suggest that there were risks and possible side effects which needed to be balanced against the potential benefits.
- 3(ai)** Most were able to identify the role of the physiotherapist, although a number were drawn in by the distracter that enabled him to cope with his lifestyle changes.
- 3(aii)** This was well answered with most candidates suggesting that it was necessary to check on progress.

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- 3(b)** This was better answered than on previous occasions with the majority of candidates achieving at least one mark. The responses about equipment, staff expertise and space were pleasingly frequent although a few fell short by only specifying better “facilities”.
- 4(a)** Most candidates scored both marks for this question, and the few who did not, wrote down two points which covered the same marking point.
- 4(b)** Almost all candidates correctly identified the head and legs on the foetal scan.
- 4(c)** Most candidates are very familiar with the technique used for collecting a blood sample and scored full marks for this question.
- (cii)** The most common answer was diabetes, although a range of suggestions were forthcoming from STI’s to HIV/AIDS . Weaker candidates often went for generalised ideas like “illness”, “disease” and “cancer” which were not specific enough for any credit. A small but worrying number of candidates decided that the answer was a “urine test”.
- 4(ciii)** Almost no **straight** lines were in evidence – but most answers were clear enough to be understood and the majority of candidates achieved one mark. The commonest cell to be identified correctly was the red cell – but many had no idea about the other two.
- 5(ai)** Most students gained all three marks; for those that got two marks, the most common mistake was ticking the ‘dietary requirement’ box.
- 5(aii)** This was surprisingly poorly answered. Most were able to acknowledge that smoking is bad for you, but were unable to link smoking to breathing and exercise. Indeed, many felt that the trainer needed to help the boys “give up” smoking.
- 5(bi)** It seems that many candidates still do not have access to a calculator during the exam. There were a pleasing number of good answers from strong candidates – but some misinterpreted the question and re-calculated Farouk’s score. Of those who showed correct substitution in the formula but did not get the right answer, the bulk had either put the wrong number of zeros on the top line or else mishandled the factor of two on the bottom line.
- 5(bii)** About three quarters of the candidates scored this mark but the rest drew a surprising number of wrong answers. Some clearly thought that they were meant to be considering Farouk and Sam – and others were clearly spooked by the fact that they had to write the same answer twice. A noticeable number had both answers correct and then crossed out a right answer, preferring a different one.
- 6)** This was a good discriminator with a decent number getting all three marks, but with a sizeable number opting for either, “to advertise new drugs” or “to test out new medicines”.

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

General Comments

The paper proved to be assessable to many candidates and provided a wide range of marks with some good discriminating questions. Most candidates were correctly entered for this Higher Tier. All candidates should, however, be encouraged to make some attempt at every question as a blank space cannot gain any marks. There were no signs that any group had been disadvantaged by the language or by any cultural issues and there was no evidence of any candidates having insufficient time to complete the paper. It is vital that centres emphasise the importance of clear handwriting and following the guidance about writing within the framework of the paper as scripts are scanned and marked on-line.

Candidates should be encouraged to look at the number of marks available for each question section and check that their answers contain at least that number of separate points. They should also be encouraged to read the question carefully and think about their response before putting pen to paper.

There is now a significant bank of past papers for this specification and centres should use these to familiarise candidates with the style and demands of questions set.

Comments on Individual Questions

Q1 (a) Answers to this tended to be centre related and there was evidence that a number of centres had failed to teach this aspect. Few candidates correctly identified label 3 as ligament – muscle was a common error here.

Q1 parts (b) and (c) were overlap questions with the Foundation tier.

1(b) having correctly identified X-ray as a non-invasive technique in **(i)**, a common error in **(ii)** was to suggest that it was used because it was harmless to the patient – there are risks with X-rays but less than those associated with surgery so the idea of less harm was required.

The best answers in **1(c)** discussed (named) benefits outweighing (named) risks.

Q2 (ai) A factor that was suggested on a number of scripts was ‘if they drink’ – this was not awarded a mark as drinking could be any liquid and at this level candidates need to be more specific in their use of language and link drinking to alcohol intake. In **(aii)** only the best candidates clearly explained why the information was needed and there were many vague references to ‘it being dangerous’ without a scientific link to why or how.

2(bi) was an overlap question with the Foundation Tier and it was disappointing to see how many Higher Tier students were unable to fill data into a simple equation and then calculate the answer. Candidates must be encouraged to show working as correct substitution into the equation would have gained them a mark even if they did not carry on to complete the calculation. It appears that a significant number of candidates did not have access to a calculator – a vital piece of equipment in any science examination.

As **2(biii)** was a 2 mark question examiners were looking for a description of an exercise programme linking (named) exercises to building stamina or a monitored progression through a series of (named) exercises rather than just an unqualified 'go running'.

In **2(biv)** a common error was to suggest that Sam's programme needed modifying because he improved – you would expect his fitness to improve because of the programme – a modification would be needed if he improved **faster** or **slower** than expected or if he became ill.

In **Q3 (a)** inaccurate use of terminology let a significant number of candidates down in this section as they described a pregnant women's stomach increasing in size. At this level uterus/womb/abdomen are acceptable but not stomach.

Few candidates gained full marks in **3(bi)** which is disappointing as this question has appeared before in an earlier paper and common mistakes noted earlier still reappeared. These include syringes being inserted into arms, needles being stuck into arteries and arms being 'strapped' but no mention of where the strap is placed.

In **3(bii)** and **(biii)** candidates appeared unsure of the term 'diagnosis'.

3(c) (i) was well answered but only the best candidates gained 2 marks on part **(ii)**.

4(a) was an overlap question and was very accessible and most candidates gained the full 3 marks. **4(b)** and **4(cii)** were good discriminators with most candidates gaining 1 mark on each of the sections but only the best candidates going on to add further explanation to gain the second marks. These are good examples of where candidates need to be aware of 2 marks needing 2 statements or an explanation of the impact of their answer for a second mark.

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

General Comments

Most candidates performed well on this paper and were well prepared for the examination.

There was no evidence that any of the candidates ran out of time.

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

- 1 Part (ai) was well answered with almost all candidates scoring at least one of the two marks. The majority went on to score both of the marks.

In part (a_{ii}), again most candidates scored both of the marks. Those candidates who did not give names but instead wrote down the agency that the three people worked for were credited if they gave the correct agency.

Part (b) proved to be a more difficult question. Candidates gave a variety of responses to this question with only the most able realising that the correct answer was to use a system of standard practice and procedures.

- 2 In part (a) candidates were provided with a list of possible correct answers. Although most candidates chose to use the provided answers in their response, a significant number either failed to realise that these answers were provided, or decided to make up their own responses. This is a risky strategy and many subsequently did not score. However those candidates who provided an alternative correct response were credited.

Parts (a_i) and (a_{iii}) were well answered with most candidates giving the correct responses.

Parts (a_{iii}) and (a_{iv}) were not well answered. Very few candidates knew that using a low power to start with allowed the user to select the area of the slide they wished to look at before moving on to using a higher power lens. Also most failed to realise that racking the lens in an upward direction prevented any damage to the slide that can occur when focussing the image.

Part (v) was well answered with some candidates also referring to using the image as evidence.

Part (b) was not answered well. Most candidates appeared to guess the correct response. Only the most able gave to increase the magnification and resolution as the correct answer.

- 3 Part (a) was answered well by most candidates. Where errors did occur it usually involved confusion between the microscope stage and the lamp. Candidates that supplied additional labels were not penalised if some of the labels were in error.

Part (b) worked very well as a discriminating question. Marks were awarded across the range from one to four. Candidates should be advised that if they draw a line in error and rub it out, this must be done completely. Failure to do so will result in the scanning process

increasing the contrast so that the deleted line looks as though it is still there. This could result in a candidate not receiving the marks that they deserve.

In part (c) far too many candidates were unable to identify an electron. This is an example of where learning simple definitions would repay dividends for the candidate.

- 4 Part (a) produced some interesting answers. Most candidates could not bring themselves to say that none of the suspects were guilty. Instead they chose the DNA profile that most closely matched the suspect. This clearly shows that many candidates do not understand the principle of DNA profiling where a close match is not sufficient. Indeed it clearly rules out the suspect. Only more able candidates said that none of the samples matched and that none of the suspects were guilty and thus cored both marks.

Part (b) was not an easy question. Many candidates gave answers that said to see if it is the victim's blood. As it had just been taken from the victim it clearly was the victim's blood. Only the most able went on to say that it was to see if the blood underneath the finger nails belonged to the victim. Credit was also given if candidates said to identify any blood that may be found on the suspect. Simply saying to identify the suspect did not score.

In part (c) candidates would have been well advised to read the question carefully. The question clearly asked for one **other** example of DNA profiling. Those candidates that simply repeated the example or referred to catching criminals did not score. Good answers referred to paternity testing, identifying breeds or checking to see if pork had been placed in food labelled as beef.

- 5 Part (a) should have been straightforward. Candidates simply had to count the gradations and multiply that number by 0.001. All too often candidates made life more difficult for themselves by thinking the outer circle was the pollen grain or that 0.001 referred to a major, not a minor division.

Candidates also made life more difficult for themselves in this section. A large number of candidates incorrectly thought that they had to use the answer from part (a) to calculate part (b). What should have been two easy marks often turned into a much more difficult question for some candidates.

- 6 Part (a) was a good test to see if candidates had used a colorimeter. A large number of answers clearly referred to chromatography and did not score. Those that referred to a colorimeter often did not know how to set one up. Good answers referred to using a colourless solution such as water and setting the colorimeter to zero.

Part (b) was about plotting points on a grid. For many candidates this proved to be too difficult and what should have been two easy marks were lost.

In part (c) candidates had to identify the outlier. If candidates identified the correct outlier in any way they were credited. The outlier had to be clearly identifiable, even if incorrectly plotted, and credit was even given for identifying the outlier by ringing the correct numbers in the table.

Part (c) required a line of best fit. Error was not carried forward so any line of best fit that correct related to the plots and went through the origin of the graph scored. Errors included not extending the line through the origin or not drawing a straight line. Credit was not given for bent or multiple lines.

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Part (e) required candidates to use their graph to determine the concentration of dye from a sweet. Many candidates failed to following instructions to draw the lines on their grid. This meant that any answer they gave had to be correct based on their graph for one mark. Candidates were not penalised for incorrect plotting of the points or not drawing a correct line of best fit. Candidates who simply gave the correct answer were awarded with both marks.

Part (f) should have been an easy end to the paper but it was clear that most candidates simply guessed the response and did not score.

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

- 1(a)** Most candidates score 2 out of 3 for this question. Incorrect placing of statement B (the results are coded for confidentiality) was the most common error.
- 1(b)** Only the better candidates gained marks here and few understood the need for public confidence in the laboratory. Most marks were gained for the idea of reliability/accuracy of the results obtained. Many gave answers explaining what was needed to gain accreditation rather than its benefits.
- 2(ai)** This question was poorly answered. Only the most able appreciated the need for reliability of results/method. Most felt that accurate results were needed but didn't give the idea that more than 1 experimenter was doing the method or that the method was being done a number of times. Weaker candidates thought it would be an easier method to follow.
- 2(aii)** The majority of candidates recognised that the specimen needed to be illuminated by the lamp and that the clips were to hold the slide in place. Where candidates didn't receive the mark they had only talked about the clips or the lamp not both. Others made general comments about being able to see, rather than see the specimen.
- 2(bi/ii)** About half of the candidates correctly identified the reason for step bi). Candidates often used the reason for step bii) as the reason for step bi) and vice versa. Common misconceptions were that step bii) was carried out to improve magnification or focus rather than to avoid damaging the lens and slide.
- 2(biii)** Nearly all candidates realised that this step was carried out to record the image or have evidence to be examined or compared at a later date.
- 2(c)** About half of the candidates knew that the magnification and resolution were increased. Those not achieving the mark thought that there was no change to resolution or magnification or that the resolution was decreased.
- 3(a)** Many candidates struggled to correctly identify the starting position of the mixture to be separated. Some were near misses but some placed it on the side bar or in the centre of the gel.
- 3(b)** Most candidates were able to correctly identify at least one sample suitable for separation by electrophoresis – often the DNA fragments.
- 3(c)** Most candidates were able to correctly show the direction of movement of the negative ions towards the positive electrode.
- 3(d)** This question was poorly answered and a number of no responses were observed. Better candidates gained one mark for talking about the size or charge on the particles. Common errors observed were the discussion of the power of the voltage, pH, positive ions, substances and mixtures.

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- 3(e)** Most candidates recognised that chromatography was an appropriate separation method. Colorimetry was the most common incorrect response.
- 4(ai)** Most candidates correctly calculated the area, although it was surprising how few candidates had the use of a calculator, as shown by the multiplication sums written out in full. Common mistakes were calculating the perimeter or calculating 9×6 and adding 0.3×0.8 to it leading to an incorrect answer.
- 4(aii)** The idea of an increase in uncertainty on multiplication was again not well understood and only the best candidates scored here. A substantial number of candidates talked about the area of the crime scene being large and evidence being found outside the area selected. 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 point. Many candidates assumed that the lengths were 'wrong' or had been 'measured incorrectly'.
- 4(b)** Candidates struggled to correctly read the Vernier scale and correct answers were rare. Many different incorrect answers were seen with 1.2 and 1.91 being common.
- 5(a)** Good candidates were able to identify that the colorimeter should be set to zero and many correctly used water or another colourless solvent. A common incorrect response was cleaning of the instrument.
- 5(b)** The points were plotted very well by the majority of candidates with only a few using the wrong scale.
- 5(c)** Few candidates were unable to correctly identify the outlier.
- 5(d)** 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.
- 5(e)** Most candidates were able to use the graph correctly to find the unknown concentration and so achieve both marks. There were a few who chose 0.3 on the wrong axis, wrote an answer ten times the value, or didn't realise that the vertical line should be drawn where the horizontal line intersected the line of best fit.
- 5(f)** Most candidates understood that a colorimeter measures intensity of colour.
- 5(g)** This was a challenging question and few candidates gained more than one mark. Candidates often tried to use the key words given when they clearly did not understand their relevance. A correct comparison of uncertainty was the most common scoring point and the idea of range (either of colours or intensity) was least understood.

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

General Comments

It was good to find that candidates were, on average, earning significantly more marks than they have done in previous seasons. Since strenuous efforts are made to keep the difficulty of the paper the same from season to season, this can only be due to the good work of centres in preparing their candidates for the exam.

There was no evidence that any strong candidates would have benefitted from doing the Higher Tier paper instead of the Foundation one. The majority of candidates attempted every question, and even the weakest managed to pick up some marks. As ever, their inability to clearly communicate their answer in extended prose lost marks for some weak candidates. It was noticeable that they fared much better with explanation questions which involved a multiple choice element.

Many candidates are not good at dealing with the aspects of the exam which involve calculations. The opportunities in the module's specification for testing their ability to do calculations are few, so are therefore quite predictable. Some practice in the final stages of revision could therefore reap a rich reward.

Comments on Individual Questions

- Q1** The vast majority of candidates earned at least half marks on this question. They all correctly identified the two hazard symbols, but some weak candidates misread the second part of the question and described the meaning of the third symbol instead of a different type altogether. Their responses had to be in written prose; some candidates failed to adequately describe the message in the visual code. Most candidates were able to earn both marks in the last part of the question about electrical safety.
- Q2** Most candidates earned about half marks on this question. Very few were able to correctly identify the integrated circuit in the circuit diagram, and the majority incorrectly chose a microphone as the input device for the circuit, even though there isn't one in the circuit at all. It was good to see that at least half of candidates could correctly calculate the power of the integrated circuit from the information given, although not all realised that too much heat can destroy components. As ever, only a small minority of candidates could draw the voltmeter in parallel with the integrate circuit, although the vast majority identified the correct symbol.
- Q3** Most candidates earned about half marks on this question. Many candidates confused the transmitter with a receiver, and incorrectly placed the aerial in the first block. Similarly, most candidates forfeited a mark by drawing in one incorrect link, with the microphone linked to the carrier of the modulator being a very popular incorrect response. Disappointingly few candidates could state the advantage of using a digital format for radio transmission, although most knew that encryption is difficult with an analogue format.
- Q4** This question proved to be much easier than the preceding two, partly because of the large multiple choice element. It was good to find that so many candidates understood the meaning of the terms input, encode and error rate. Most knew that governments decide on the protocols for communication systems. Almost every candidate suggested that the invention of the mobile phone or telephone has increased the quantity of human communication. No surprise there.

- Q5** This was the first of two questions which also appeared on the Higher Tier paper. It was designed to be only accessible to candidates working at grade D or above, and turned out to be so in practice, with only the strongest candidates earning half marks. Many candidates were unable to use the information provided to complete the block diagram, but many knew that the arrows showed the flow of information. Many weak candidates struggled to describe the difference between block and circuit diagrams. Although some candidates were able to use the information provided to calculate the number of pixels in each row, almost none were able to calculate the video bit rate.
- Q6** As expected, only the strongest candidates earned half marks on this question about communication with radio waves. For many weak candidates, the only mark they earned was the first one, where the mobile phone was a very popular correct answer. Unfortunately, few were able to explain why linking with radio waves confers a degree of mobility that other links do not. Candidates appeared to be guessing the frequency for their example, although strong candidates were able to say something sensible about the problems of using radio waves as the link.

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

General Comments

This paper is designed to be access to candidates operating at grade C and above. As ever, about half of the candidates would have earned the same grade if they had sat the Foundation Tier paper instead, and would probably have had a more enjoyable exam experience as well. There is no advantage for candidates to enter the Higher Tier unless they are definitely operating at grade C.

This paper requires candidates to earn a fair proportion of the marks through written prose. Many candidates struggle to express themselves clearly, losing marks in the process. They could perhaps benefit from more practice at developing this skill with past paper practice. Enough versions of this paper have already been set to cover almost any question that can be asked on the specification for this module; the answers are already out there in the public domain!

Comments on Individual Questions

- Q1** This question also appeared on the Foundation paper. As expected, the majority of candidates earned high marks overall. The overwhelming majority of candidates opted for mobile phones as their example of radio wave communication, although only the strongest could correctly identify the frequency involved. Although most candidates were able to explain the disadvantages of using radio waves as a link, they were not good at providing reasons why it is a better link than wire or cable for their example.
- Q2** This question also appeared on the Foundation Tier paper. Only weak candidates struggled to complete the block diagram, but all of them knew that the arrows showed the flow of information. Weak candidates failed to express clearly enough the difference between block and circuit diagrams, forfeiting the mark. Only half of the strongest candidates were able to correctly calculate the video bit rate and bits for each row from the information provided. There are few opportunities for calculations in the specification for this module, and they come up regularly in the exam. Perhaps candidates could do with a bit more practice at them just beforehand?
- Q3** On average, candidates earned half of the marks on this question which covered a range of areas of the specification. Strong candidates had no problem with drawing the high voltage hazard symbol, but only half of them could say anything sensible about the use of an earth leakage device to reduce the hazard. Too often they simply talked about the device letting electricity escape safely to the earth - earning no marks at all. However, the great majority of candidates could name two digital storage devices (other than the hard disc already mentioned in the stem of the question) and most could explain the advantages of compressing a file.
- Q4** Most candidates struggled to earn more than a third of the marks for this question about an electrical circuit. None of them were able to complete the block diagram completely correctly, with many assuming that the switch and not the LDR was the input. Only a small minority of candidates realised that the switch had to supply current to more than just the integrated circuit, indicating that their understanding of current electricity in parallel circuits was not good. Only half of the candidates could rearrange the equation provided to calculate the maximum voltage across the integrated circuit. Sadly, but not unexpectedly,

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although most candidates were able to draw the correct symbol for a voltmeter, few were able to draw it in the correct place in the circuit.

- Q5** This question provided good discrimination, with only strong candidates earning the majority of the marks. Although most candidates did not confuse the system with a radio receiver, only a minority remembered that a modulator combined the signals from the microphone and oscillator. Similarly, most candidates knew that an amplifier increased something, but only a few had the language skills to state what that something was. Strong candidates did well on the last part of the question, showing a good grasp of the meaning of the terms encrypting, sampling and encoding.
- Q6** It was sobering to find so many weak candidates unable to offer the keyboard or mouse of a computer as its input device. However, as expected, only the strongest candidates could describe its operation as a converter of information into electrical form. The last three parts of the question required candidates to explain the meaning of three terms used in communication. Few candidates were unable to do this using words other than those used in the term. For example, saying that the data transmission rate was the rate at which data was transmitted earned no mark, whereas saying that it was the amount of information per second did.

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

General Comments

The candidate entry and performance was fairly similar to the five previous examination sessions.

There were some pleasing aspects of improvement such as,

- very few scripts showing little knowledge and understanding
- very few “no responses” ie no attempt to answer a question
- many genuine attempts to write a full explanation/ description instead of a one word answer
- fewer examples of poor technique by ticking too many boxes or drawing too many lines.

Many candidates continue to have problems with simple calculations, distinguishing between qualitative and quantitative tests and understanding quality marks.

The very poor performance in describing how to take geranium cuttings was a surprise.

Comments on Individual Questions

Q1

This question on breeding sheep was quite well answered.

- (a) Most candidates knew that sheep produced wool but there was some confusion over whether it was a gathered harvest.
- (b) This type of sequencing question is normally well done and most candidates scored one or two marks. A common mistake was to put C (embryo development) before A (fertilisation).
- (c) This question on artificial insemination proved to be rather demanding with about 30% of candidates scoring zero. Some candidates were confused and described selective breeding.

Q2

This question was based on growing sugar beet and results showed a good range of marks.

- (a) Most candidates correctly identified photosynthesis as the process of making sugar but fewer candidates realised that light was required. A common incorrect answer was oxygen.
- (b) The majority of candidates showed a good understanding of the data. However a common error was simply stating that the sugar cane produced 10 tonnes of sugar per hectare instead of using a comparison.
- (ci) Most candidates correctly identified the growing stage of sugar cane but fewer candidates were able to identify a processing stage.
- (cii) The identification of qualitative/ semi-quantitative and quantitative tests continues to be a problem with only about 50% of candidates selecting the correct answer. The specification lists many examples of each type of test.

(ciii) A wide range of answers were accepted to explain why the bag of sugar was sealed.

Q3

This question was based on keeping cattle. Parts a) and b) were common with Higher Tier and therefore targeted at Grades D/C.

- (ai)** It was pleasing to note that virtually all candidates correctly interpreted the graph of growth rates of three different cows.
- (aⁱⁱ)** Many weaker candidates failed to suggest an acceptable reason for the different rates of growth. Few candidates correctly identified two reasons such as age/ genetic differences/ disease. Vague answers such as environment and exercise were not accepted.
- (b)** There was much confusion over the word “fertiliser”. Some candidates wrote that manure fertilised crops rather than providing fertiliser for them. There was a common misconception that the manure acted as pesticides protecting the crops from insects. However, some answers were very informative and well explained.

Q4

This question was based on keeping hens. Parts b(ii) and b(iii) were common with Higher Tier and therefore targeted at Grades D/C. Overall the question produced a good spread of marks.

- (a)** Surprisingly, only about 65% of candidates correctly identified the type of farming involved in keeping hens.
- (bi)** Only about 50% of candidates were able to correctly calculate the percentage of barn hens. From the incorrect responses it was clear that many candidates did not understand percentages.
- (bⁱⁱ)** An explanation for battery hens producing cheap eggs proved to be rather demanding. Far too many candidates simply copied information from the table without selecting relevant information or processing it. Many answers referred to cruelty.
- (bⁱⁱⁱ)** Explanations as to why keeping battery hens could be thought cruel were rather vague and lacking in detail. Simply referring to the “5 freedoms” without descriptions or explanation was not accepted.
- (ci)** and **(cⁱⁱ)** The understanding of a quality mark continues to be a problem.

Q5

This question was based on growing geranium plants. It produced a good spread of marks.

- (a)** The matching of parts of the container with their job was well done.
- (b)** The majority of candidates knew that pH was a measure of acidity or alkalinity.
- (ci)** Candidates were asked to describe how geranium cuttings were taken. It was surprising to note how few candidates were able to offer a reasonable attempt at a description. It was obvious that the majority of candidates had never taken a cutting or seen one being taken. About 75% of candidates scored zero marks and only a handful of candidates scored the maximum of three marks.
- (cⁱⁱ)** The poor response in describing an advantage of this type of reproduction over using seeds was also a disappointment, Only about 50% of candidates offered a correct explanation such as same quality/ same characteristics/don't have to buy seeds etc.

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

General Comments

The candidate entry and performance was fairly similar to the five previous examination papers.

There were some pleasing aspects of improvements such as

- more effective targeting of Higher Tier resulting in few very poor scripts
- more genuine attempts to write an explanation/ description.

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

It would appear that many good “grade C” candidates are being entered without being taught the necessary Higher Tier material. Answers to Q5 on genetic modification showed an almost complete lack of knowledge and understanding on the topic.

Comments on Individual Questions

Q1

This question was based on growing sugar cane and sugar beet. Although it looked similar to the Foundation paper the questions were different.

- (ai) It was rather disappointing to note that about 20% of candidates could not produce even a partly correct word equation for photosynthesis. Many did not realise that glucose is a sugar (which was already written in the equation)
- (aii) Most candidates were able to write down correct limiting factors for photosynthesis, although some wrote down “water” despite being asked for factors other than water.
- (bi) Most candidates were able to process the information about growing sugar cane and sugar beet. A common error was not to write a comparison of yield.
- (bii) Most candidates were able to score one mark to explain why polytunnels should produce a bigger yield but fewer were able to score 2 marks. This was usually due to a vague or irrelevant answer.

Q2

This question was based on keeping cattle.

- (ai) Most candidates were able to correctly identify the fastest growing cow.
- (aii) As in Foundation Tier, most candidates were able to correctly identify one reason (such as age) for the different rates of growth but struggled to think of a second reason (genetic differences/ disease).
- (b) Most candidates realised that manure acts as a fertiliser. However two marks were on offer and answers such as “for plant growth”, “because it contains minerals”, can be used to produce fuel”, were expected.
- (c) Most candidates were able to correctly identify a microorganism and a food product from it, a pleasing improvement on previous examinations.

Q3

This question was based on keeping hens and parts were also on the Foundation Tier.

- (a)** Explanations as to why eggs produced by battery hens were the cheapest varied from clear and precise to vague and rambling. Some candidates simply copied data from the table or wrote about why it was cruel.
- (bi)** As in (a), there was a wide range in the quality of the answers. Higher Tier candidates must realise that a low quality of answer such as “they won’t have a job”, “customers won’t be able to buy eggs from battery hens” will not score any marks.
- (bii)** Most candidates correctly identified cramped conditions limiting movement as one way in which keeping battery hens could be thought cruel, but few were able to identify other reason to gain 2 marks.
- c)** As in previous examinations, there is a poor understanding of a quality mark.

Q4

This question was based on keeping sheep.

There was much confusion over selective breeding in a) and artificial insemination in b). Crossing out and reversing answers was common. Some candidates gave up and wrote the same answer to both questions.

- (a)** This question on describing selective breeding has been set in many of the previous examinations....and it is now part of the Key Stage 3 curriculum. It was therefore surprising to note that only a handful of candidates scored the maximum 3 marks. A common omission was repeating the process over many generations.
- (b)** This question on artificial insemination fared better than a) with about 50% candidates scoring the maximum 3 marks.
- (c)** This question is based on a topic in bold in the specification. Most candidates knew that hormones were somehow involved in breeding but lacked any relevant information as to how (controlling oestrous cycle, controlling egg release, controlling birth time etc). About 50% of candidates scored zero marks.

Q5

This question was based on genetic modification of rice.

Such questions on previous examinations have scored badly so a diagram was included to help them.

However it was obvious that very few candidates had any knowledge of genetic engineering....another topic in bold in the specification.

- (a)** Only about 50% candidates knew that DNA is the genetic material in chromosomes. Answers such as nucleus, genes. chromosomes were common.
- (b)** Candidates were asked to use the diagram to explain how the gene for vitamin A production got into the rice plant.

About 75% of candidates scored zero marks and only a handful of candidates scored 2 marks. A common, incorrect explanation involved the bacteria getting into the rice. Answers involving planting seeds and selective breeding were also common showing that candidates had completely ignored the diagram.
- (c)** Candidates were asked how the Golden rice produced vitamin A (expression of the genetic code, gene controlling production of a particular protein/ enzyme). Only about 5% candidates scored a mark.

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

- 1 Part (a) was answered well by most candidates. Almost all candidates correctly identified the chemical symbols for magnesium and calcium, but many made mistakes when identifying potassium and sodium.

Only the most able candidates scored both marks on part (b). Many candidates guessed both of the answers and 'water' was given as a common incorrect response. It was all too rare to see both hydrogen and magnesium chloride.

Part (c) was generally well answered. However many candidates failed to show their working and if they gave an incorrect response, this could well have cost them a mark. Surprisingly very few candidates failed to give the £ symbol and a significant number scored both of the marks for this section.

- 2 In part (a) surprisingly a significant proportion of candidates failed to score full marks. Common errors included calling a conical flask a graduated flask and confusing the magnetic stirrer with a top pan balance.

Part (b) was often incorrectly answered with many candidates thinking the correct answer was a measuring cylinder, rather than a burette. This was possibly due to the candidates lack of familiarity with a burette as a piece of laboratory apparatus, even though it was often correctly identified in the previous question.

- 3 Part (a) was extremely well answered with almost all candidates responding correctly with 25%.

The same cannot be said for part (bi) and (bii). An assortment of incorrect answers was given, with 4 being the most common incorrect response for part (i). This was presumably because they failed to identify that hydrogen appeared twice in the formula. In part (ii) a common incorrect response was 7 as the candidates had evidently just added the two numbers together, forgetting about the OH group.

Part (c) was not well answered. Answers that we were looking for included compounds such as ethanol, methane etc. However all too often a class of compounds were given such as fuels, or specific substances such as sugar cane or crude oil. Only the more able candidates were able to score on this question.

In part (d) although most candidates answered correctly, "it produces little waste" was a common incorrect response.

Part (e) was quite well answered. Most candidates scored at least one mark with many getting two or three. Common errors were getting 'esters' and 'carboxylic acid' the wrong way round or using 'filtering' instead of 'refluxing'.

- 4 Part (a) was not well answered. Many candidates gave less than 7 as an incorrect response. This is a classic case of where learning simple definitions such as pH would repay dividends.

Part (bi) was answered well by most candidates. Those who did not score were clearly guessing at the correct response.

Part (bii) was not answered well. Candidates clearly did not understand what was meant by 'manufacturing on a large scale'. A variety of incorrect responses were given and it was all too rare to see good responses such as sulphuric acid or ammonia.

Part (ci) was worth two marks and candidates generally scored both of the marks, or neither of them. Good answers included speeding up chemical reactions without being used up by the reaction. Weaker responses attempted to use the diagram above the question and gave responses about heating the iron.

Part (cii) should have been two easy marks. All that was required was that the air would be cheap and that there was plenty of it. All too often responses referred to it being pure or natural or that it would help the environment by either removing or not adding to pollution.

Part (ciii) is another example of the importance of learning basic definitions. It should have been an easy mark but all too often it was either a 'no response' or simply an incorrect guess.

References to light or energy were ignored and only a correct reference to heat was credited.

The most common answer to part (d) was organic. Only the more able candidates gave the correct answer to this question.

- 5 In part (ai) very few candidates scored full marks. A very common error was to place step C as second in the chain thus limiting themselves to three marks.

Part (a(ii)) was only credited if the candidates said that warming would either speed up the reaction or increase the rate of dissolving. Just saying "to dissolve the magnesium oxide" did not score.

In part (a(iii)) examiners were looking for the idea of removing any un-reacted residue. However answers such as this were few and far between. Credit was therefore given to the idea of removing any solid that remained in the solution. Even so, good answers were not often seen.

In part (b) many candidates went down the incorrect route of simply adding more chemicals. This proved to be a very common response and only the more able took the different route of saying that larger crystals would form if the solution was cooled down more slowly.

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

General Comments

The exam had the normal format of 45 minutes for 36 marks. Candidates appear to have had no problems in completing the paper within the time allocated. There were few cases of candidates not attempting questions and these were spread throughout the paper indicating that time constraint was not a problem.

Recommendations for teaching:

- Calculation questions need practice. Candidates should be encouraged to use a calculator and to show their working out to help examiners follow their logic to enable credit to be given where appropriate.
- Equation solving is a difficult skill when using words or symbols. Candidates should be given a range of examples to practice on in order to develop their skills in this area.
- Standard procedures need to be practiced more by Centres if time allows enabling candidates to become more familiar with the methods of working.
- Basic definitions need to be learned better in order to score relatively easy marks.

Candidates need to be more aware that questions with more than one mark allocated will require them to say more than one thing in their answer.

Comments on Individual Questions

Q1(a) Many candidates seemed to understand the basics of standard procedure but Centres must ensure that the reasons for each of the stages are better understood to help with remembering the correct sequences. A good understanding of the idea of adding heat energy to a reaction to speed it up was shown by many candidates and most understood the reasons for filtering. There were few references to removal of the unreacted excess solid magnesium oxide, however, which would have been a good higher level answer.

Q1(b) Surprisingly few candidates were able to explain about cooling more slowly to create larger crystals.

Q2(a) Manufacturing methods seem to be well understood by candidates.

Q2(b) Many candidates understood and were able to answer correctly about the advantages of continuous production methods, but fewer were able to score two marks for defining a catalyst as a chemical that speeds up reactions without being used up itself. The definitions of endothermic and exothermic need to be distinguished and learned properly by candidates.

Q2(c) Balancing a symbol equation, even a partly written out one, proved quite a challenge and only a few candidates managed to score both marks.

Q2(d) Pleasingly, many candidates were able to use their basic mathematical skills to substitute numbers into a given formula and then calculate the correct answer.

- Q3(a)** The understanding of the idea of functional groups proved as elusive this time as it did in the last session. Good candidates were able to explain what they did and to identify the –OH group of the ethanol molecule. It was again pleasing to see that large numbers of candidates were able to calculate a relative formula mass from a list of relative atomic masses and a molecular formula.
- Q3(b)** Many candidates were able to recall the idea that sustainable processes use renewable resources but then failed to move on to score the second mark about the implications of this in terms of energy use, pollution, waste production etc.
- Q3(c)** The process of making esters was not well understood and only a very few candidates were able to score both marks for this question.
- Q4(a)** The definition of an emulsion was not well known or expressed
- Q4(b)** Examples of emulsions were varied and often wrong. It would be good if Centres could give the candidates some standard examples to learn to help with answering questions like this.
- Q4(c)** Again, candidates found it difficult to express the idea of emulsifying agents clearly. The simple idea of keeping an emulsion from separating was all that was required.
- Q4(d)** The definition of a suspension was not well known or was badly expressed. It was, however, encouraging to see that most candidates were aware of the need for safety testing before a chemical product is released onto an unsuspecting public.
- Q5(a)** Neutrality testing was understood well. It is important to link the test used to the proper result. The best answers used named indicators and their appropriate result, such as universal indicator/green, pH meter/reading of 7 etc. Some answers were vague and did not use an actual test. Examples included things like use a pH chart, use a pH scale and use a pH test.
- Q5(b)** Accurate measuring equipment needs to be used whenever possible in practical sessions so that candidates understand more fully the meaning of accuracy.
- Q5(c)** This calculation was not well answered by candidates. The conversion of litres to cm^3 again proved to be a stumbling block to most candidates.

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

General Comments

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

It is important to emphasise to candidates the need to answer the question asked, not the one that they 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

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

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

There was no evidence that candidates ran out of time.

Comments on Individual Questions

Q1a & b) The majority of candidates answered these questions fully and scored high marks, many scoring 6 or 7 marks. The most common error in (a) was linking 'swimming float' with 'brittle'. In (b) nearly all candidates linked a 'cricket bat' with 'wood' but there was a definite confusion between 'polymer' and 'ceramic' and between 'composite' and 'alloy'. Some candidates drew two lines from a left hand box to the right hand side these candidates automatically penalised themselves.

Q1c) There were a number of able candidates who drew clear labelled diagrams and gave a clear explanation correctly mentioning the method of clamping, hooking weights to the frame and using a metre rule to measure the change of shape. Unfortunately many diagrams were unlabelled or without a method of measuring the flexibility. Weaker candidates had a problem explaining how to carry out the experiment and gave answers that were little more than a repeat of the stem of the question or gave no explanation. Weaker candidates often confused flexibility with strength and tested to destruction.

Q2) This was a well answered question, weaker candidates sometimes drew lines to more than three properties and therefore could only gain a maximum of one mark.

Q3a) Part (i) was well answered by the majority of candidates. In part (ii) a common error was in not answering the question eg. 'in a toilet' or 'in an amusement park' do not give a use for a mirror.

Q3b) In (i) it was common to see 100dB mistakenly underlined. In (ii) the vast majority knew loud noises could lead to loss of hearing but only a minority could spell 'deaf' or 'deafness', similarly in (iii) the correct spelling of decibel was rare and here only the more able knew the unit.

Report on the Units taken in January 2010

- Q3c)** These two questions were well answered although weaker candidates did significantly less well in linking the best reason for using PVC as the outer layer of an electric cable with low electrical conductance.
- Q4** This question, as a whole, proved to be the most difficult on the paper and it was apparent that many candidates had very little knowledge of lens or had examined cameras and how they work.
- Q4a)** It was obvious that many candidates had not studied, in any depth, a camera and the majority gained only one or two marks out of the four available, usually the viewfinder and the lens.
- Q4b)** Even with the diagram of a cut away convex lens in part (a) half of the candidates had difficulty in identifying the convex lens as the correct answer. In (ii) the majority of candidates scored two or three marks, the mark most often lost being that parallel rays are brought to a 'focus' In (iii) very few knew that it was 'refraction' that caused the change in direction and in (iii) over ninety percent thought the surface coating was to protect the lens, very few realised it was to do with reducing reflection.
- Q5a)** The calculation proved pleasantly surprising with just over half the candidates scoring both marks. Many weaker candidates struggled with the arithmetic and it seemed that many did not have a calculator.
- Q5b)** These questions were fairly well answered with no common mistakes.

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

General Comments

There are a number of places in this specification where candidates are required to give examples of materials or artefacts that display particular properties or combinations of properties. In the past, few candidates have been able to recall examples that they have studied. In this paper there was more evidence of those examples having been learnt and understood. However, with a relatively low entry, this evidence is weak and the exhortation to candidates must still be to read carefully what the specification statements ask for.

Most candidates made a fair attempt at all questions, and were able to follow instructions, when presented with new scenarios or novel arrangements. Numerical ability was higher than in the past.

This is the 'Materials and Performance' unit. Therefore, definitions of terms such as malleable, tough, plastic etc. are specific and precise. There are many examples of candidates interpreting these at the 'man in the street' level rather than as a materials' student.

Comments on Individual Questions

- Q1(a)** There were very few fully correct answers to this question. In particular, the shutter and aperture were often reversed.
- (b)** Many candidates gave contradictory answers to the first part, e.g. real and virtual, or inverted and upright, which suggests an insecure understanding of the terms. The term 'refraction' was only well recognised by the most able candidates. It was surprising that, since it is a straight specification statement, very few candidates could explain correctly why the camera lens is coated.
- Q2** Most candidates were successfully able to substitute the correct values appropriately into the equation given in part (a) and calculate the result. Most could also recognise the outlier in part (b) and rank the materials in the correct order. However, very few picked the correct phrase in part (b) (iii), most opting for the presence of an outlier as being the source of unreliability.
- Q3(a)** The definition of a metal 'alloy' is a specification statement, but very few candidates could recall this, and weaker terms were accepted.
- (b)** A few candidates failed to use the given passage as instructed, and so failed to give satisfactory responses.
- (c)** A definition of 'ductility' is not provided by the specification, and a variety of appropriate definitions were accepted. References to 'flexibility' were however not allowed as this can be a property of brittle materials.
- (d)** Most candidates answered this correctly, demonstrating good scientific comprehension of the given passage.
- Q4(a)** Circuit diagrams still cause most candidates difficulty. The question was very precise in asking for a 'circuit diagram' to include ammeter and voltmeter, and for all components 'including the sample' to be labelled. A large majority of candidates failed to label the sample, which makes it difficult to award further marks. Many drew pictures rather than

circuit diagrams, and those who had supplied a drawing with the two meters and supply clearly labelled, but without the conventional circuit symbols were not penalised. However, only a few scored full marks on this part. The majority of candidates who extracted values from the graph in (a)(ii) were also able to correctly evaluate them, but most only made the most obvious comment about the graph in (a)(iii) and ignored the instruction for 'two' things to say about it.

Q4(b) This question required candidates to provide an example of a material used for a 'particular purpose'. A number of candidates failed to describe any 'purpose' for their material, which precluded them from gaining any further marks. Some candidates gave the same example for both parts, which suggested a too casual reading of the question. However, encouragingly only a few candidates re-used the example of 'power cables' in part (ii), where they were required to find 'another' example. In previous papers this has been a common failing.

Q5 As in previous series, it was evident that the concept of momentum is not well understood by candidates. Many failed to match quantities to symbols correctly in the equation. Those that did were generally able to manipulate the resulting calculation. In part (a)(ii) the anticipated response had been to 'increase the time of the collision'. However, most candidates moved immediately to suggest one of the well known mechanisms for doing this (air bag, crumple zone etc). However, since the question referred to the force of the collision on the car, seat belts – which will reduce the resulting force on the passenger – were not admitted as a correct response. Only a very small number of candidates recognised the meaning of the area under the graph in part (b), with most erroneously guessing that the 'peak' or 'slope' was the important property.

Grade Thresholds

General Certificate of Secondary Education
 Additional Applied Science (Specification Code J632)
 January 2010 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	19	16	13	0
	UMS	34	n/a	n/a	n/a	30	25	20	15	10	0
A324/02	Raw	36	33	28	23	19	16	14	n/a	n/a	n/a
	UMS	50	45	40	35	30	25	20	n/a	n/a	n/a
A325/01	Raw	36	n/a	n/a	n/a	24	20	16	12	8	0
	UMS	34	n/a	n/a	n/a	30	25	20	15	10	0
A325/02	Raw	36	32	27	22	17	12	9	n/a	n/a	n/a
	UMS	50	45	40	35	30	25	20	n/a	n/a	n/a
A326/01	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
A326/02	Raw	36	32	26	20	15	10	7	n/a	n/a	n/a
	UMS	50	45	40	35	30	25	20	n/a	n/a	n/a
A334/01	Raw	36	n/a	n/a	n/a	25	21	18	15	12	0
	UMS	34	n/a	n/a	n/a	30	25	20	15	10	0
A334/02	Raw	36	32	27	22	18	15	13	n/a	n/a	n/a
	UMS	50	45	40	35	30	25	20	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	31	26	21	16	13	11	n/a	n/a	n/a
	UMS	50	45	40	35	30	25	20	n/a	n/a	n/a
A336/01	Raw	36	n/a	n/a	n/a	25	21	18	15	12	0
	UMS	34	n/a	n/a	n/a	30	25	20	15	10	0
A336/02	Raw	36	30	25	20	16	12	10	n/a	n/a	n/a
	UMS	50	45	40	35	30	25	20	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/index.html>

Statistics are correct at the time of publication.

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