

Applied Science

Advanced Subsidiary GCE (Double Award) **AS H375**

Advanced Subsidiary GCE **AS H175**

Report on the Units

June 2006

H175/H375/MS/R/06

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The reports on the Examinations provide 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 syllabus content, of the operation of the scheme of assessment and of the application of assessment criteria.

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G622 – Monitoring the Activity of the Human Body

General Comments

All questions were attempted by the majority of the candidates. Time does not appear to have been an issue in terms of completing the paper.

Comments on Individual Questions

- 1
- (a) A large number of candidates forgot or did not know that the left side of the diagram represents the right side of the heart.
 - (b) Most candidates provided correct the response.
 - (c)
 - (i) Many could provide one difference stating only that the wall was thinner.
 - (ii) Few candidates gained both marks. Since both chambers collect and pump blood it was necessary for candidates to qualify their answers with additional information to gain both marks.
 - (d) Some candidates produced sound descriptions here. Most described the role of the right side of the heart in delivering blood to the lungs and back and the left's to the 'body' and back. More able students linked this to distance and consequent muscle requirement. One QWC mark was awarded for 'organisation' and the other for 'appropriate use of English'.
 - (e) The majority could position the 'X' with sufficient accuracy to be awarded the mark'.
 - (f) Most candidates gained this mark. The commonest response was 'as pacemaker' but other appropriate descriptions were accepted.
 - (g) Few failed to gain at least two of these marks. Not surprisingly the commonest error was in the direction of flow with some candidates putting arrows for both directions on the same line.
- 2
- Some candidates 'designed and completed' a 'generic' risk assessment form that bore no relationship to the context of this question. Risk assessments, e.g. for working with concentrated sulphuric acid, did not provide many opportunities to award marks in the context of microbiological hazards in a medical laboratory. A small number of the cohort 'designed' but did not 'complete'. The last paragraph of the question was provided to help candidates in terms of structure, and involved information taken from previous assessment items used for this part of the specification. Sadly, some failed to take the hint. Centres are advised to check the published mark scheme for guidance on how the marks were awarded.
- 3
- (a)
 - (i) Those who failed to gain both marks usually left the tidal volume blank.
 - (ii) Phonetic versions of spirometer were accepted. Commonest error was 'peak flow meter'.
 - (b) Most candidates could provide the correct range or an answer within it. Candidates should re-read their responses however.
 - (c)
 - (i) The majority gained 2 marks here.
 - (ii) Most used the information in the test and their calculation to come to an acceptable conclusion.
 - (d)
 - (i) Basic information not known by a disappointingly large number of candidates.
 - (ii) Most candidates carried out the calculation correctly and an error carried forward was allowed from (c) (i) when appropriate.
 - (iii) Most candidates made at least one acceptable statement but very few had a sound grasp of the physiology behind this question. This section of the question was targeting higher grade levels and Centres are advised to read the published mark scheme to see the level of response expected here.

- 4 (a) Very few candidates produced pleasing responses here. Most candidates were unable to provide accurate recall of insulin and glucagons. Glucagon is frequently referred to as glycogen. The roles of the two hormones are often reversed. This appears to be a perennial problem area.
- (b) (i) & (ii) This question proved to be more difficult than was intended. (i) was included to address how someone actually carries out the test – what they have to do and (ii) was there for candidates to explain what was going on at a physical or chemical level during the test – how the test works. Centres are advised to read the published mark scheme to see the level of response expected here.
- (c) (i) Candidates need to learn the data stated in the specification.
(ii) This question was intended to bring out the vocational context. The idea of their value to the dietician in terms of management or treatment of patients and their value as indicators of health or unhealthy state. Candidates probably had the information but did not use it in the ‘applied’ context.
- 5 (a) Few candidates could carry their description through to a sensible conclusion. Centres are advised to review the information in the booklet on imaging methods in the teachers’ guide. This would be of help to candidates with respect to the level of content expected in future assessments. One QWC mark was awarded for the use of ‘specialist terms’ and the second for ‘spelling, punctuation and grammar’.
- (b) Most candidates gained two of the three marks available here.
- (c) Only the more able candidates registered that the doctor was concerned that the patient might have internal injuries and soft tissue damage linking that to the better resolution of soft tissue by a CT scan as compared to conventional X-ray.
- (d) Most candidates gained at least one mark here.
- 6 (a) (i) Most candidates gained two marks here.
(ii) To answer correctly with respect to trends rather than differences here, candidates needed to consider the data over the whole of the time period from 0 to 90 minutes. If their response was ‘horizontally derived’ rather than ‘vertically derived’ from the data, they were awarded data marks, where correct, but no marks for the differences.
(iii) Most candidates found one appropriate body temperature. Either 39.3 or 39.5 were accepted answers.
- (b) Candidates were expected to find and record comparatives and not descriptives. Many candidates were more successful here than in (a) (ii).
- (c) (i) Most candidates suggested that there would have been less oxygen in the air in Mexico. Answers referring to lower air pressure or the air being ‘thinner’ were also accepted.
(ii) Many candidates made at least one acceptable statement here but very few had a sound grasp of the physiology involved. This section of the question was targeting higher grade levels and Centres are advised to read the published mark scheme to see the level of response expected here.

G623 – Cells and Molecules

General Comments

All questions were attempted by the majority of the candidates. Again, time does not appear to have been an issue in terms of completing the paper.

Comments on Individual Questions

G623/01 Planning Exercise

Marking Point

- A** The risk assessment should be a working document. It should relate to the task set and not simply generic. Students failed to gain this marking point due to lack of reference to electrical and chemical hazards.
- B** The prediction had to be comparative and related to sugar content in the chosen apple varieties. Simply mentioning sweetness or expected colour changes when heated with Benedict's reagent was not sufficient.
- C** Few candidates gave adequate justification for their prediction using biological knowledge. Many responses included reference to dessert apples tasting sweeter or cider apples having high tannin content.
- D & E** Many students did not produce any preliminary work.
- F & G** Where preliminary work was considered, in many cases, it was not justified or related to the main method of the investigation. Relevant examples of such work could have included, among others, mass of tissue to use, processing of apple extract and range of colour standards to use.
- H & I** Whilst many students noted 2 sources, the relevance of these sources to the planning exercise was not appreciated or securely evidenced. Students must give full details of web addresses and/or books, magazines and newspaper articles used.
- J & K** Many students achieved marking point J. However, lack of detail in the method, or confusion of techniques within a single method meant that many candidates did not achieve marking point K. Some students failed to appreciate that their method should have been comparative. Colorimetric details were often absent. Centres should emphasise the need to use excess Benedict's reagent when testing for reducing sugars rather than 'one or two drops'.
- L & M** Students need to give 'qualified names' e.g. '250 cm³ beaker' rather than 'beaker' and number of pieces of a particular piece of apparatus, and quantities of reagents etc. to gain M.
- N** Students need to appreciate the importance of replicates or repeats and to make statements to that effect in order to justify gaining this marking point.
- O & P** Whilst the majority of students stated an appropriate range of apple types, many candidates failed to state why the measurements were needed to gain marking point O.
- Q & R** Once more many stated a minimum of 3 variables as dependent, independent and controlled, but few explained how (or why) these variables needed to be controlled.
- S** Many students planned to tabulate their data in a suitable format. However, units of measurement should always be included in the headers.
- T** Many students planned to display their results graphically. Standard curves for glucose concentrations were often plotted against % absorbance or transmission. However weaker candidates often interpreted these curves incorrectly, with curves indicating higher % absorbance as equivalent to lower glucose concentration.
- U** Means and graphical estimations of sugar content in apple samples were often given.
- V** Very few students scored this point. Students must state their expectations of the kind of results that would confirm or reject the prediction they made in B. Weaker candidates often interpreted standard curves incorrectly as reported in T.

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- W** Some students were able to recognise one possible source of error only, in their equipment. At least two were needed to gain this marking point e.g. age of fruit, ripeness of fruit; sources of fruit; release of sugar from tissue; discrepancy in colour analysis.
- X** Many candidates were able to suggest at least one possible method to improve the accuracy or validity of their data.
- Y** The majority of candidates were able to use apposite scientific terminology and gained this marking point.

G623/02 Test

- 1
 - (a) This section was not well answered. Candidates must become more familiar with the main sections of the electron microscope and their functions.
 - (b) Many students recognised that air molecules would obstruct the electron beam.
 - (c) Answered well.

- 2
 - (a) Again, this section was not answered well. The specification states that candidates should be able to explain how and why Coulter counters are used, not simply to describe their use. From their responses it would seem that many students had not studied this technique in the depth required and perhaps, in some cases, not at all. Many wrote about the use of the haemocytometer instead of the Coulter counter. Centres are advised to look at the published mark scheme for further information.
 - (b) Many candidates scored at least one of the marks available here. Commonest answers included 'quicker' and 'can be automated.'
 - (c) Some candidates gained one mark in this section. More able candidates recognised that counting dead cells leads to an over estimate. Very few candidates could recall that Coulter counters can count air bubbles and particles as well and that these too would lead to over estimations of live cell count.

- 3
 - (a) Answered well but many students simply stated individual organs affected rather than the relevant body systems.
 - (b) Many candidates scored at least two marks for answers relating to consequences of congestion of the lungs. However, fewer marks were awarded for the consequences of a blocked pancreatic duct. Centres are advised to look at the published mark scheme for further information.
 - (c) Whilst a majority of students correctly explained the meaning of mutation, very few correctly defined coding or recessive with reference to knowledge of DNA structure. Some linked coding to a 'sequence', but very few managed to identify a specific order of three bases.
 - (d) Not answered well. Few students appreciated that CFTR spans the membrane or crosses the lipid bi-layer or that it acts as an ion channel.
 - (e) Students made a fair attempt at this section, with many scoring two of the accepted content marks together with the two QWC marks. Few students mentioned the possibilities of error in testing or the cost effectiveness of screening.

- 4 Surprisingly, this question was not answered well. Many candidates had little factual knowledge of the reagents used for the expected observations if starch, fat and protein are present in a food. Recall of the facts associated with basic food tests is expected at Key Stages 3 and 4. This area of work is covered by the G623 specification and it will appear again.

GCE Applied Science (AS) H175, H375 – Portfolio Units

General Comments

This is the first main assessment session for this qualification as only a small number of centres offered portfolio work for assessment in January 2006. This type of assessment is new to a large number of centres and it is notable that many centres have applied the assessment criteria very accurately and have assessed their candidates' work at the correct level.

The portfolio units available for this session were as follows:

- Unit 1 Science at Work
- Unit 2 Analysis at Work
- Unit 5 Chemicals for a Purpose
- Unit 6 Forensic Evidence
- Unit 7 Physics of Sport

The majority of centres were very responsive in returning scripts for moderation and where there was a low entry it was appreciated that centres sent all scripts directly to the moderator. This saved time and led to an efficient moderation exchange. It was appreciated that the completion time in May caused some problems to some centres but it is hoped that in future assessment sessions, and as centres become more familiar with the needs of the assessment criteria, this will be overcome. Work from many centres was well organised and clearly annotated with the assessment criteria codes. This helped moderators locate assessment requirements over a wide range of candidates' work that was presented. Appropriate page numbers on portfolios is really appreciated as this helps moderators locate work.

Some high quality and interesting up-to-date science was seen and where centres had given candidates clear, well structured assignments linked to the assessment criteria, the work produced, reflected the standard required for an AS level qualification. It is a requirement for most of the practical work assessed that risk assessments are included, but some centres failed to do this.

In the majority of centres candidates' work was at an acceptable standard for AS level. It was however necessary to scale some centres where marks were too generous as they did not reflect particular criteria sufficiently or where centres assessed work to mark band 3 when it was only mark band 2. Several top candidates' work was scaled as at this high level evidence produced by candidates needs to show thorough and detailed research, which has been suitably selected and records of practical work which are both accurate and precise, with suitable processing and interpretation. It is hoped as this qualification develops centres will become more aware of work requirements at the higher levels. A number of centres however tended to be harsh in their marking, this tended to be at the lower mark bands.

Work selected for moderation reflected a good coverage of all the Units offered by this AS specification. A range of marks was seen. However, candidates need more guidance and support in the use and selection of research material obtained from the internet.

Unit 1 Science at Work

This is a mandatory unit and was completed by all candidates taking both the AS single award and the AS double award. A number of centres had submitted work for this unit in January and some candidates had resubmitted upgraded work again for this assessment session.

AO1a It was good to see that many centres had encouraged visits to local organisations or candidates had interviewed, or listened to, professional people from a range of places e.g. local supermarkets, restaurants, food chains, power stations, dentists, opticians, health & fitness clubs, chemical manufacturers, pharmacies, The Eden project, aquariums, zoos, garden centres, bakeries, breweries, engineering firms, computer companies, fire service, forensic service, cement/paint manufacturers, nuclear power stations and waste management organisations. A large number of local companies were also used. Some centres however tended to focus on professions. This is not how the research should be tackled; it is the actual organisation that needs to be researched.

The survey requires evidence of information on the products made or service offered, the type of work information on the science involved and some information regarding health and safety. Many centres have encouraged candidates to include information on these points and record them in a range of ways - presentations, leaflets, posters and reports. Where candidates have worked together to research their organisations evidence of individual summaries should be presented. Mark band 3 work should cover all the bullet points given above and show evidence that a range of sources have been used. Information on websites, books used, visits, any speakers etc., should all be included. The text of the survey should use candidates own words. Information cut and pasted from internet sites is insufficient, however, original printouts, from the internet, showing material selected for use is a useful indicator of the research. If fewer than five surveys are included in the portfolio, then credit should still be given for those organisations that were surveyed. The mark allocated then needs to be averaged.

AO1b It was envisaged that centres should choose one of the organisations studied in the survey for the in-depth study. A range of good, clear reports were seen focused on the requirements given in the specification. However, several candidates did not focus on one of their surveyed organisations but just wrote a little extra over a number of organisations in their survey. This is not needed. For mark band 3, the additional guidelines indicate a comprehensive study is required and information should be selected and clearly and logically presented. Candidates who just included large quantities of research from the internet which was not selected should not be awarded higher grade criteria. Some evaluation and justification of the use of the material needs also to be included for the higher mark bands. The main study should reflect coverage of all the bullet points given in the specifications. Comments on the validity of the sources used must be included if mark band 3 is to be reached. There was minimum evidence of evaluation and justification of the research material.

AO1c Candidates who had visited organisations or who had interviewed staff members clearly had gathered comprehensive and useful information about health and safety. Evidence was seen of knowledge of health and safety laws and regulations, but it should be noted that work on these regulations is needed for all mark bands. For higher mark bands to be reached, evidence of links of how organisations comply with the health and safety laws is needed. Contributions to this strand can come from evidence included throughout the unit; however risk assessments alone are insufficient for even mark band 1.

AO2a The work for this strand in the majority of scripts seen was included as part of the in-depth study. It would however be useful for moderators if an indication was given on the URS form of where this evidence could be located within the unit. Mark band 3 work should encompass the majority of the bullet points listed in the specification and the work submitted relate to the organisation chosen. Some evidence was seen of general discussion on the impact on society of organisations, which bore no resemblance to the specification guidelines. Best practice was seen in centres where candidates had clearly extracted the evidence and related their knowledge to each of the bullet points in the specification and used their own words in the reports. This clearly showed evidence of the requirements of AO2, application of knowledge of the impact of society of the work of scientists.

AO2b A wide range of calculations linked to practical work were seen, however many were unmarked or incorrect. Work submitted tended to be assessed correctly at mark band 1 and 2 but for mark band 3 work should be correct and answers given to the appropriate degree of accuracy, and correct significant figures. More than one example should be submitted for the higher mark bands and work can be supplemented with additional tasks to cover a range of mathematical work, especially if the practical task completed does not lend itself to calculations. It should be noted that mathematical guidelines on straightforward and complex calculations are given in the appendix of the specification.

AO3a Two practical activities should be submitted for this part of the assessment. Some centres allowed candidates to include several pieces of work that they had completed during the course whereas others seemed to include just one. The practical tasks completed by candidates need to be of a standard suitable for AS and not GCSE otherwise assessment is limited. If centres use ideas from GCSE then they should be expanded upon in order to bring them in line with the standard required. Many centres used the suggestions given in the teacher's guide and extended them to link to a vocational context, which was good to see. Some very interesting information was seen especially on preservation, uses of chromatography and food analysis. A range of physics, chemistry and biological work was evident. Where centres used practical ideas from other units the work submitted must relate to the assessment criteria for this unit.

It may be useful in the future to include a brief statement from the assessors that the practical work had been safely completed. Risk assessments should be included, with evidence to show that they have been used during the practical work.

AO3b It should be noted that AO3b is assessed for recording only. In qualitative analysis, observations should include what is seen at the end of the experimental test and whether there has been a change or not, as it is often as important to identify what is not present as well as what is. 'Nothing' is not really a suitable description.

The recording of titration results should be to at least one decimal place and set out in a suitable format if mark band 3 is to be accessed. Measurements need to show the required precision and include the relevant units. Omission of units was widespread. Candidates cannot reach mark band 3 if they have been provided with the format to record their results.

AO3c Work for this strand should show suitable processing with interpretation even for mark band 1. It is also important to clearly show the method of processing the results for higher mark bands and, in addition, evaluation of the accuracy of apparatus and method is needed if mark band 3 is to be accessed. Processing skills in graphs and calculations were clearly evident in work seen. However, interpretation of results should include reasons.

Unit 2 Analysis at Work

This was the first assessment session for this unit and centres found this the most difficult for candidates to access. The problem of not having an available text book meant that unless candidates had access to the Internet it was difficult to find information on energy policies of organisations. Centres which used the energy policy of their school or college led to excellent work which clearly reflected the requirements of the assessment criteria. It is hoped that as the specifications develop, ideas will be circulated at training events and hopefully through the OCR website, information for this unit will be more easily accessible.

AO1 The work seen on energy policies was wide ranging. Candidates who accessed the energy policy from their own establishments were able to present suitable work at mark band 3 as they were able to select the relevant information and give a detailed description of the policy. Evidence was also seen on how energy efficiency had been considered as many candidates had been able to interview staff who had been involved in working on, and with, the requirements of the energy policies. Information found from the internet was varied and candidates need to check that they are using the 'energy policy' of the chosen organisation and not an environmental policy. It should also be noted that the organisation chosen needs to be a non-domestic consumer. Some centres chose energy producers. Work for AO1b on energy efficiency should include what measures are put in place by companies and colleges in order to become more energy efficient. A definition of energy efficiency was often seen without any reference to anything else. Centres should focus on Section 2.2.5 Efficiency in the specification and link it to the requirements of AO1b. A lot of information was seen on environmental impacts and effects of fossil fuels on the environment. Candidates need to ensure that they extract relevant information and relate it to their chosen organisation. A lot of cut-and-paste was seen, but it is hoped that as staff and candidates become more aware of the requirements this will reduce and candidates will select work and organise it appropriately. Although this has been difficult to cover by many centres it is both a very important and topical issue.

AO2 It was hoped that candidates would describe the different types of energy transfers that might be present in the generation of electricity. This seemed to be omitted from many candidates' work. Information on calorific values was difficult to find but many centres accessed costs of a range of fuels such as coal, gas, and nuclear. The cost of running wind farms was included and acceptable as information on this was easily accessible. Some centres produced excellent work sheets to support the work for AO2 which included suitable references to researched data. A range of calculations was seen. 'Complex' calculations can be considered to be multistage. Again reference should be made to the appendix of mathematical requirements in the specification. Accuracy and correct solutions are needed to fulfil the requirements of mark band 3. Work on comparing the benefits and problems of large-scale and small-scale electrical generation was evident in a lot of the work moderated but for mark band 2 and 3 some reference to quantitative information is required.

AO3 A wide range of practical work was seen which reflected all the mark bands, and many centres used the examples given in the teachers' guide. Work seen generally reflected mark bands 1 and 2 but it needs to be noted that work for mark band 3 needs to be suitably detailed, with evidence of vocational links and have evidence from the assessor that risk assessments have been produced and used and that equipment has been utilised safely. Results need to be suitably presented, processed and interpreted. Suitable evaluation is needed and this needs to be focused on the method and outcomes of the specific experimental work completed and not just a generic statement of the success of the work.

Centres need to be aware that the requirements of the practical work in this unit include **two** physical analyses, both chromatography and colorimetry. Some centres only completed one of these experimental procedures but marked this out of 8. Qualitative chemical analysis examples included investigative work on unknowns, forensic investigation, 'mummion', water, pollution analysis. Quantitative analysis examples included food analysis, a wide range of volumetric analyses, vinegar, iron tablets, bleach etc. Good practice was seen where practical work had a vocational link. It is hoped that centres in the future will link the work to a suitable vocational context. The requirements of the assessment criteria for each practical include production of a suitable report. This does not necessarily mean to rewrite a method followed. A reference to the standard procedure followed is sufficient, however inclusion of risk assessments is important and a record of relevant observations and/or measurements made. Work for all levels should also show some processing and interpretation of results.

Unit 5 Chemicals for a Purpose

This AS level unit is an optional part of the double award and it is hoped that this unit will offer candidates the opportunity to extend their chemistry knowledge and study the properties and actions of examples of chemical products used in consumer goods. Of the optional units, this was the least popular choice and work seen was varied and much of the higher mark band work did not reflect the quality needed for mark band 3. There is a lot of guidance given in the specification under 5.4 'Guidance for Teachers' and in 'Guidance on Delivery'. This section gives additional guidance for each section of 'What You Need to Learn' from the specification with examples of compounds, processes, catalysts and practical work. Centres are advised to use this when preparing for this unit.

AO1 Although it clearly states in the assessment criteria 'give 4 examples of chemical compounds (two organic and two inorganic)', some centres allowed candidates to submit lists and tables of many examples, without even focusing on the requirements for mark band 2. Guidance needs to be given to the candidates in their choice of examples to ensure that they can continue through AO1. For example, candidates need to choose compounds which will allow them to link properties to uses and structures, so that the higher mark band can be accessed. AO1c also requires that one of the examples should be either a polymer or a detergent. The requirement for this strand is that the chemistry of the example chosen is researched and studied, so it is important that the polymer chosen has suitable reactions that candidates can understand. It is hoped that for higher mark bands there will be evidence of understanding the chemistry of the chemical chosen. AO1c should identify one of the compounds identified in AO1a. Lack of subscripts does not show fully explained reactions with appropriate scientific terminology for AO1c and only mark band 1 should be awarded.

AO2 A range of both organic and inorganic industrial processes were included e.g. Haber process, Contact Process, fractional distillation/cracking and reforming. Work on catalysis was suitably discussed; however the advantages and disadvantages of the processes were not given enough detail for mark band 2 or 3. It is suggested that centres refer to the teacher's guidance given in the specification.

AO3 It needs to be noted that for this strand candidates need to prepare a sample of a chemical on a laboratory scale and carry out some tests to determine its purity. Risk assessments need to be included for all mark bands. Evidence is needed that the candidate has researched a method for the preparation and they have followed it safely to prepare the product chosen. Information on apparatus used is needed for mark band 2 and it was good to see photographic evidence of candidates' apparatus. In AO3a the candidate should research the method themselves if high mark bands are to be achieved and evidence of selectivity should be shown. Results need to include the yield and, for AO3b mark band 2, the yield should be calculated correctly and for mark band 3, how the theoretical yield is calculated needs to be included to reflect suitable knowledge at this level. For AO3b candidates need to record all mass results to the same number of decimal places for mark band 3.

Unit 6 Forensic Science

This was the first time work was presented for moderation, a good range of work was seen and generally it was assessed to the correct standard.

AO1 Centres whose candidates used scenarios to assess AO1a produced some good evidence on the need to record and preserve a crime scene. The work in these cases was focused on a particular crime scene and candidates demonstrated an understanding of the need to recognise evidence and record it in place at the crime scene or preserve it for later use. Candidates gave interesting and informative work on methods of recording the crime scene through the use of photography, video methods and sketches. Again, where centres had related AO1b how forensic scientists collect and visualise evidence to actual crime scenes, candidates were easily able to relate three examples of the different techniques (one of each chemical, biological and physical). The specification needs to be referred to ensure that the examples chosen by candidates do actually cover each of the three techniques. Centres need to note the mark allocation for this section AO1b (12 marks) and consequently allocate an appropriate time to allow candidates to work on this section. Work on ethics was very varied with some centres not appreciating that, for mark band 3, work should show a range of relevant information on ethical issues in forensic work. Work on an ethical code for forensic scientists was rarely seen by moderators. This should include relevant points from the current legal framework. Mainly candidates just discussed the reasons for and against taking DNA samples and keeping this information on a database.

AO2 Good work was seen where centres had based this tasks specifically on a chosen case study. For example, O J Simpson was particularly popular and this gave plenty of information for candidates to base their report on evidence and proof which included the ways that the forensic scientists ensured that the quality of evidence was objective, strengths and weaknesses of the analytical techniques which were used in the case and an interpretation of the probability of guilt. Calculations on forensic data were difficult to find, however, a range of R_f values were required for mark band 1, refractive index calculations required for mark band 2 and for higher mark bands several centres produced data sheets of qualitative data which had been collected and set appropriate problems based on this. This was similar to work given in the teacher's guide.

A03

Here was a wide range of methods of analyses of evidence and it was hoped that, given the four areas of forensic analysis, this would give candidates the opportunity to complete a number of different types of analytical techniques. It was not expected that candidates needed to cover all the methods of analysis listed in the specification and also it was hoped that the words given in the specification would be a guide to where candidates would physically carry out practical tasks or in some topics just carry out the analysis by using records and evidence provided. Some interesting scenarios were set up and again, as the specification becomes more established, it is hoped that the sharing of good practice will lead to useful ideas and resources being available. Popular experimental work included e.g. work on fingerprinting and taking footprints, measuring and using photographs of tyre prints, microscopic techniques looking at different types of hair, fibres, finger/toe nails, use of artificial blood for testing and analysis, chemical tests both inorganic and organic, analysis of unknown substances, e.g. fertilizers, copper sulphate, calcium carbonate, sugar and the use of 'artificial' urine samples. Various chromatographic work was seen on inks, dyes, amino acids, with the use of IR spectroscopy for identification. Refractive Index of glass was seen from many centres. As well as carrying out this work candidates needed to record their forensic observations or measurements and the data needed to be displayed in a range of ways for mark band 2 and above. Again for mark band 3 candidates need to process and interpret their results and so, using a case study or a set up crime situation, could access the higher mark bands as there was opportunity to discuss the significance of the results found.

Unit 7 The Physics of Sport

This AS level unit is an optional part of the double award but it was the most popular of the three optional units. A wide range of interesting leaflets on a variety of sports were seen, with evidence that candidates had enjoyed finding out about different sporting activities. It is hoped that in the future more practical work will be linked to each of the topics to support understanding.

AO1 & AO2 The evidence to be provided was slightly different in this unit, as candidates were asked to produce six leaflets on a range of topics. The topics related to measurement, seeing, movement, choice of ball material and equipment and techniques in sport. Some centres did not expect their candidates to present their work as a set of leaflets but they produced lengthy reports, very often including a lot of information directly taken from websites. This was not what was expected. For mark band 3 it was hoped that although the assessment criteria stated 'demonstrate a comprehensive and detailed knowledge and understanding' this should be still shown in a leaflet with evidence suitable selection of the correct material. This demonstrates a higher level skill.

The assessment criteria clearly states that five different quantities needed to be considered for the measurement leaflet and both units and devices for measuring these are needed. Some weaker candidates just recorded a number of SI units which is insufficient evidence for mark band 1. Some very detailed work on the structure of the eye was seen, but a link to the chosen sport was needed. Some good work was seen which linked to winter sporting activities such as skiing, snowboarding etc. Football, tennis, surfing and snowboarding were popular sports chosen for the movement leaflet and again mark band 1 candidates just gave evidence of musculo-skeletal systems with no particular link to the chosen sport. It was expected that centres could generate data from practical work covered in this section to fulfil the requirements of AO2b. Centres should refer to Section 7.2.2 Physics of the Body.

Choice of ball material and equipment in sport produced a wide range of interesting work with much evidence seen as to how research into materials and new technology has developed over the years and is responsible for the high quality sporting equipment we use today. Evidence was needed from both these topic areas for AO2a and candidates were expected to at least give reasons for the selection of a particular material for its chosen use and, for mark band 3, some reasoning behind their choice. Simple statements were insufficient for higher mark bands. It was hoped that work on sports techniques would allow candidates the opportunity to complete practical work on momentum. This was seen in several centres and candidates used results and data collected to support mathematical evidence for AO2b. This was good to see.

AO3 Centres need to be aware that 19 marks are focused on the practical requirements for this unit and consequently the time spent on practical work should be allocated accordingly. The practical activity could be an additional piece of work and, although it should relate to the work covered in the leaflets, candidates can produce a separate piece of evidence to cover AO3. Evidence of planning the investigation tended to be weak and to just focus on one experiment. For mark bands 2 and 3, a range of techniques need to be included in the work presented and a range of tests carried out with evidence of the need to repeat. Risk assessments were not always included and interpretation of the data collected in many cases only reflected mark band 1.

Advanced GCE Applied Science AS (H175, H375)

June 2006 Assessment Series

Unit Threshold Marks

| Unit | | Maximum Mark | a | b | c | d | e | u | Total nos of candS |
|------|-----|--------------|----|----|----|----|----|---|--------------------|
| G620 | Raw | 50 | 40 | 35 | 30 | 25 | 20 | 0 | 947 |
| | UMS | 100 | 80 | 70 | 60 | 50 | 40 | 0 | |
| G621 | Raw | 50 | 40 | 34 | 29 | 24 | 19 | 0 | 979 |
| | UMS | 100 | 80 | 70 | 60 | 50 | 40 | 0 | |
| G622 | Raw | 90 | 69 | 60 | 51 | 42 | 34 | 0 | 1017 |
| | UMS | 100 | 80 | 70 | 60 | 50 | 40 | 0 | |
| G623 | Raw | 90 | 71 | 62 | 53 | 45 | 37 | 0 | 447 |
| | UMS | 100 | 80 | 70 | 60 | 50 | 40 | 0 | |
| G624 | Raw | 50 | 40 | 35 | 30 | 25 | 20 | 0 | 143 |
| | UMS | 100 | 80 | 70 | 60 | 50 | 40 | 0 | |
| G625 | Raw | 50 | 40 | 35 | 30 | 25 | 20 | 0 | 248 |
| | UMS | 100 | 80 | 70 | 60 | 50 | 40 | 0 | |
| G626 | Raw | 50 | 40 | 35 | 30 | 25 | 20 | 0 | 264 |
| | UMS | 100 | 80 | 70 | 60 | 50 | 40 | 0 | |

Specification Aggregation Results

Overall threshold marks in UMS (i.e. after conversion of raw marks to uniform marks)

| | Maximum Mark | A | B | C | D | E | U |
|------|--------------|-----|-----|-----|-----|-----|---|
| H175 | 300 | 240 | 210 | 180 | 150 | 120 | 0 |

| | Maximum mark | AA | AB | BB | BC | CC | CD | DD | DE | EE | U |
|------|--------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|---|
| H375 | 600 | 480 | 450 | 420 | 390 | 360 | 330 | 300 | 270 | 240 | 0 |

The cumulative percentage of candidates awarded each grade was as follows:

| | A | B | C | D | E | U | Total nos of candidates |
|------|-----|-----|------|------|------|-------|-------------------------|
| H175 | 1.2 | 9.6 | 26.7 | 52.1 | 80.4 | 100.0 | 543 |

| | AA | AB | BB | BC | CC | CD | DD | DE | EE | U | Total nos of candidates |
|------|-----|-----|-----|-----|------|------|------|------|------|-------|-------------------------|
| H375 | 0.5 | 1.0 | 3.8 | 9.6 | 16.7 | 26.8 | 38.8 | 58.9 | 70.3 | 100.0 | 248 |

For a description of how UMS marks are calculated see;
www.ocr.org.uk/OCR/WebSite/docroot/understand/ums.jsp

Statistics are correct at the time of publication.

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