OCR
RECOGNISING ACHIEVEMENT

GCE

Applied Science

Advanced GCE **A2 H575/H775**

Advanced Subsidiary GCE **AS H175/H375**

Report on the Units

January 2008

H175/H375/MS/R/08J

Oxford Cambridge and RSA Examinations

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REPORTS ON THE UNITS

G620, G621, G624, G625, G626: AS Portfolio Units

General Comments

This is the third January assessment session for this qualification. Many Centres are now accredited and it was noticeable that several were sampled this session. Generally, Centres are now applying 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 Science
- Unit 7 The Physics of Sport

It was a credit to the Centres in that they were very responsive in returning scripts for moderation and where there was low entry it was appreciated that Centres sent all portfolios directly to the moderator; this saved time and led to an efficient moderation exchange. Centres are now returning the Centre Authentication form with the candidates' work and most work from Centres was well organised and presented using treasury tags which allows moderators to easily read the work, which is appreciated. Centres are also writing comments and page references on the URS forms, this again supports the moderation process.

It is very useful to the moderators when Centres include the tasks sheets set for the portfolio work, this helps to support the moderation process, however, only a minimal number of Centres are including the task sheets.

The majority of Centres candidates' work was at an acceptable standard for AS level with accreditation of Centres ongoing.

Scaling of candidates' work occurred mainly at the higher mark bands. Work submitted did not reach the necessary standards required by the assessment criteria i.e. work was not sufficiently detailed and accurate and evaluations not at a high enough level for A grade work.

Work selected for moderation reflected coverage of all the Units offered by this AS specification. A range of marks was seen. Candidates use and selection of research material obtained from the internet is showing a noticeable improvement.

Risk assessments are now being included with practical work as evidence of safe working but possibly more guidance is needed to ensure these are suitably detailed and not generic.

Unit 1 Science at Work

This is a mandatory unit and is completed by all candidates taking both the AS Single Award and the AS Double Award. The majority of candidates are now completing the 5 surveys and an in-depth study. However, although some excellent selection of work extracted from the internet was seen, Centres should be encouraged to allow candidates to research from a variety of sources e.g. possible visits, the use of leaflets and information booklets as well as the internet. It should be noted that for mark band 3, evidence of relevant information selected from a range of sources should really be recorded. It is good practice to include the resources used as a bibliography and should be encouraged. The range of organisations included many easy accessible organisations e.g. supermarkets,bakeries, breweries, hospitals, opticians, doctors, dentists, chiropodists, health centres, garages, colleges, universities schools, fast food establishments, as well as several manufacturing organisations.

Candidates need to ensure each survey includes:
- the products made or services offered
- the type of work that takes place
- an identification of the science involved (more focus is needed on this area - more guidance is needed to candidates to ensure this is covered)
- the inclusion of information on Health & Safety constraints and guidance used in the organisation is useful for the survey and can also support the assessment for AO1c.

The text of the survey should use candidates own words. Information cut and pasted from internet sites is insufficient, although less of this was seen this session. Excessive detail is not required for the surveys. This work is intended to be an overview of science in the work place. If fewer than five surveys are included in the portfolio, then credit needs to be given for those organizations that were surveyed. The mark allocated needs to be averaged.

The majority of candidates are now focusing on one of the organisations studied in the survey for their in-depth study. They need to ensure that the following guidance is used:
- explanation of what is produced or details of the service offered
- information about the organisation including the number and range of staff employed (careers information can be used here)
- further details on the scientific job roles specifically related to the chosen organisation
- some explanation and detail of the science involved in the organisation
- any further specific detail on research, quality control
- details and specific links of the Health and Safety laws and regulations used is important here for AO1c.

Again for mark band 3 the additional guidelines indicate a comprehensive study is required and information should be selected and clearly and logically presented. Some evaluation and justification of the use of the materials needs also to be included for the higher mark bands. 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. However some excellent work was seen with precise informative research.

For AO1c even for mark band one, candidates need to show awareness and a basic knowledge of Health and Safety laws and regulations. Higher marks can be obtained where candidates link Health and Safety with their surveys and also make suitable links in their main study. Contributions to this strand can come from evidence included throughout the unit.

Where Centres gave structured guidance candidates were demonstrating information of the impact the organization has on society. Candidates need to include appropriate information from the following guidelines:
- the contribution to the economy and management of costs
- details on waste management and environmental issues

- ICT uses (where appropriate)
- details on the effect on the community (employment/transport) and the environment
- energy requirements
- benefits to the society.

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.

It should be noted that mathematical guidelines of straightforward and complex calculations are given in the appendix of the specification. A wide range of suitable calculations were seen linked to practical work offered. Calculations 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. Centres are now submitting a range of calculations rather than just one example and evidence of additional tasks to cover a range of mathematical work was also seen to support mark band 3.

It was noticeable this session that Centres are now encouraging candidates to link their practical tasks to a vocational context, this is good to see. In fact the range of research and interesting facts seen linked to analysis and preparative work was extremely encouraging. Candidates are also including suitably detailed risk assessments with their work and many assessors are now clearly giving evidence that candidates had completed their practical activities.

It should be noted that AO3b is assessed for recording only. Accuracy of recording needs to be watched. The recording of titration results should be at least one decimal place and set out in a suitable format. All measurements need to show the required precision and include the relevant units. Omission of units was still widespread.

Generally work seen is now being assessed appropriately for processing with interpretation even for mark band 1. Candidates are now showing the methods of processing of their results for higher mark bands and in some cases evaluation of accuracy of apparatus and method is being included for mark band 3. Processing skills in graphs and calculations were clearly evident in work seen. Many candidates are still omitting units from graphs and not choosing suitable scales, more guidance is needed on this.

Unit 2 Analysis at Work

Work moderated for this unit was much better this session. A range of Energy Policies were seen and the correct range of practical exercises was generally submitted.

It is now good to see that the majority of Centres are now guiding their candidates to complete work on Energy rather than environmental policies. It is difficult in some cases to extract the energy related information from organizations ‘energy/environmental information, but where selection occurred, candidates gained high marks. Sainsbury’s, Tesco, colleges and universities and many local authorities have suitable information on energy and environmental work.

Work for AO1b on energy efficiency is improving but there are still omissions in what measures need to be put into place by companies in order to become efficient. Only a few definitions of energy efficiency were seen. Centres should focus on Section 2.2.5 Efficiency in the specification and link it to the requirements of AO1b.

Environmental issues are very topical and a great deal of good research have been produced here however candidates need to ensure that they extract relevant information and relate it to their chosen organization. This topical issue is now being covered in a lot more depth and at a higher level than in previous sessions.

Again much better, we are now seeing energy transfers involved in the generation of electricity and where work is brief it is being assessed accordingly.
More relevant data is now being seen and candidates are now making a comparison of the relative benefits and problems of large scale and small scale electrical generation. Accuracy and correct solutions are needed to fulfil the mathematical requirements of mark band 3, these need to be worked on by candidates.

The candidates are now completing suitable practical work and are including detailed risk assessments. The requirements being two physical analyses both chromatography and colorimetry, one qualitative chemical analysis examples can include investigative work on unknowns, forensic investigation, mummion, water, pollution analysis and one quantitative analysis examples seen included analysis of water vinegar, iron tablets, bleach ear drops metallic solutions etc.. Good practice was seen where practical work had a vocational link and again this was evident.

Reports do not necessarily need a rewrite of experimental methods but care needs to be taken that suitable detail is given on recording and processing of results. Care however is also needed in accuracy of calibration graphs for colorimetry, several errors were seen here.

Work seen generally reflected mark bands 1 and 2 but it still needs to be noted that work for mark band 3 needs to be suitably detailed, with evidence of vocational links and evidence from the assessor that risk assessments have been produced, used and equipment has been safely used.

Suitable evaluation is needed and this needs to be focused on the method and outcomes of the specific experimental work completed, not just a generic statement of the success of the work.

Unit 5 Chemicals for a Purpose

This AS level unit is an optional part of the double award and it is hoped that this work 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. Unfortunately many scripts were seen with simple errors in equations and basic chemical knowledge.

Most candidates are now choosing 4 compounds: 2 organic and 2 inorganic. Generally the standard of AO1 was an improvement of work seen in the previous session, which was encouraging. Candidates should be guided to choose compounds which will allow them to find information on both uses and properties of these compounds. It should also be noted that for the chosen compound for AO1c details are needed on how the structure and chemistry relates to its use.

Again for AO2a popular industrial processes were: Haber Process, Contact Process, fractional distillation/cracking, reforming. Centres need to note that two industrial processes are needed with conditions, raw materials and uses of the products. Care is needed on the accuracy of any equations given.

Candidates generally gave clear and detailed work on catalysis however advantages and disadvantages of the processes were not given enough detail for mark band 2 or 3. Again it is suggested that Centres refer to the teacher's guidance given in the specification.

Although aspirin was popular, preparations of paracetamol, iodoform, esters, haloalkanes and carboxylic acids were seen. Care still needs to be taken that sufficient detail is given to the requirements of the assessment criteria to ensure suitable evidence is produced to

enable higher mark bands to be reached. Please can candidates be encouraged to draw diagrams to scale – more care is needed in this area.

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 AO3 b candidates need to record all mass results to the same number of decimal places for mark band 3.AO3c needs to show an awareness that the yield can be increased by changing conditions just for mark band 1. This strand was generally not well done and candidates need to work on improvements for this section.

Unit 6 Forensic Science

A limited amount of work was presented for moderation this session. The work moderated however was appropriately assessed and the task sheets which were seen logically covered the requirements of the specification. Candidates show enthusiasm in this topic which is indicated by the huge quantity of work completed.

Generally work seen covered the requirements of the assessment criteria and candidates gave interesting and informative work on methods of recording the crime scene through the use of photography, video methods and sketches. Centres need to note the mark allocation for this section AO1b (12 marks) and consequently allocate an appropriate time to candidates to work on this section. Where AO1b work was linked with AO3a it seemed to link together well. Work on ethics was varied in detail, but generally candidates were not gaining the higher mark bands. For mark band 3 a range of relevant information on ethical issues in forensic work is needed. Work on an ethical code for forensic scientists was not always included.

Case study work tended to be quite good but more discussion of strengths and weaknesses of analytical techniques used and an understanding of the probability of guilt with a review of the evidence needs to be worked upon with candidates. Some good work was seen on a college case study.

Calculations included a range of Rf values for mark band 1, refractive index calculations and bullet projectiles for mark band 2 and 3.

Experimental work again included work on fingerprinting and taking footprints, measuring and use of photographs, a range of microscopic techniques , use of artificial blood for testing and analysis, chemical tests both inorganic and organic analysis of unknown substances. Chromatographic work included analysis of inks, dyes, amino acids, lipsticks, with the use of IR spectroscopy for identification. Refractive Index of glass was seen from most Centres. Mark band 3 candidates need to ensure detailed processing and interpretation of their results.

Unit 7 The Physics of Sport

It was good to see work which showed candidates' enthusiasm in the physics of sport. Some Centres included a wide range of practical work linked to the appropriate topics to support understanding which was good to see and this should be encouraged.

Candidates are now producing suitably sized leaflets and Centres are generally supporting candidates in using their own words rather than cut and paste from the internet. More evidence is being seen on the linking of scientific knowledge to the chosen sport or equipment. Cricket, golf, tennis and skiing continue to be the most popular sports chosen.

Again evidence was seen of practical activities based on movement which generated data which covered AO2 and AO3. Centres should refer to Section 7.2.2 Physics of the Body.

Care needs to be taken to ensure work on choice of ball material and equipment in sport is candidates own words, cut and paste are common in this area. Research into materials and how new technology has improved performance again was seen. Where candidates gave evidence and reasons for selection of a particular material for its chosen use mark band 3 was appropriately given. Work on sports techniques should allow candidates 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.

It again should be noted that 19 marks are focused on the practical requirements for this unit and consequently the time spent on practical work should be allocated accordingly. A range of practical work was seen this session which can be submitted for AO3. Evidence of planning is needed and a range of techniques need to be included with a range of tests carried out with evidence of the need to repeat. Risk assessments should be included with suitable interpretation of data.

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) Either answered well or very badly. Most students scored 6 marks out of the 7. Weaker candidates often confused anaerobic and aerobic products. Some failed to give two substrates for aerobic respiration.

(b) A surprisingly large number of candidates failed to give the importance of respiration as a release of energy. Many imprecise examples offered for the use of energy.

(c) Many students could link the supply of oxygen and glucose to cells via some reference to ventilation, nutrient uptake and transport by the blood. However, not many mentioned disposal of the named products. More able students scored three out of the 4 possible marks.

2 (a) (i) Most students were able to recognise and label the structures of the heart, although some confused left and right sides and made incorrect references to deoxygenated blood transfer for C in 2a(ii). Some students mixed up tricuspid and bicuspid valves. Some students gave mitral and atrio-ventricular valves as alternative responses. Majority of candidates appreciate the role of valves in the heart.

(b) (i) Very few candidates gave the correct answer here – many left this blank.

(ii) Generally answered well although some candidates just wrote that this side 'just pumped blood to the body' without making a comparative reference to the role of the right side of the heart.

(c) Very poorly answered. Responses were far too vague.
Nervous: not answered well. Majority of students failed to score here. Few mentioned the role of the SAN.
Hormonal: more able students linked adrenaline release to an increase in heart rate.

3 (a) (i) Most students are now rote-learning these values.

(ii) Not answered that well. Students still have difficulty in manipulation and calculation.

(iii) A surprising number of candidates failed to gain any marks on this section. Most students made a reasonable attempt at this cloze activity. Not many scored full marks but whilst the words which they inserted into the sentences did not make sense, in some cases, students clearly had an understanding of gas exchange and the adaptations of lung tissue.

(b) Most students attempted this question; 4 out of the 6 marks were common.

4 (a) (i) Most students scored one mark here – fever or hypothermia were common answers.

(ii) Few students scored 2 marks – many students repeated stem of question, often quoting increased reliability in their answers.

(iii) This was answered well, with many students obtaining the second marking point.

(b) (i) Spelling of sphygmomanometer continues to be a problem. Whilst some flexibility was allowed here, some students clearly had no idea. Some confusion arose between ECG and the sphygmomanometer.

(ii) Most students attempted this and often scored 2 out of the 3 marks. Few made reference to the marking points referring to the measurement of systolic and diastolic pressures. Some weaker students just referred to the cuff as 'it' and failed to gain the mark as a result.

(iii) This question proved to be too testing for a large number of candidates. Very few students could identify the three graph lines. However, the majority of students attempted and scored at least 2 out of the 4 marks for section 2.

5 (a) (i) Most candidates made a satisfactory attempt at this section of the question.

(ii) Not many candidates could provide enough evidence for the five marks on offer here. Since their knowledge of the principles was so limited few candidates scored the QWC mark for scientific terminology.

(b) A wide range of responses were seen here. Candidate responses confused MRI with CAT scans with too many candidates giving 'radiation' as a hazard here. Students failed to recognise the difference between ionising radiation and electromagnetic radiation.

6 (a) Most students attempted this section which was generally well answered. Common responses included reference to 'confirmation of agreement' and 'protection of doctor and or hospital from litigation'. Only the more able students could distinguish between the idea of 'informing' the patient' and checking the 'understanding demonstrated by the patient'.

(b) Generally answered well. Most students obtained the QWC marks. Weaker candidates failed to read the question carefully and did not focus on the ethical and moral dilemmas.

G623/01: Cells and Molecules - Plan

General Comments

The majority of student plans investigated the comparative activity of bromelain in the three tissues of pineapple using developed photographic film. However, it was pleasing to note that students in a few Centres chose colorimetry as an alternative method. Centres are asked to ensure that candidates read the instruction brief carefully to avoid misinterpretation i.e. to ensure that a comparative analysis of the three tissues is included in the plan.

It makes good sense to go through a completed plan to check that all the criteria have been met. However it is not permitted practice to do so on the copy to be submitted and under no circumstance should the submitted copy be 'premarked' in red biro. It is suggested that Centres provide students with a self assessment tick sheet to ensure that their work addresses all the marking points before final submission.

Please will Centres ensure that attendance registers for the planning component are included with their candidates' scripts.

Comments on Individual Questions

A This needs to be a working document relevant to the intended practical work. An appreciation of electrical hazards (blender/colorimeter); glassware; sharps; irritant/allergy (juice); leaf spines; disposal of silver waste needed to be recognised. Level of risk and control measures need to be addressed.

B Prediction needs to be comparative and relating to bromelain activity in the three tissues.

C Justification of prediction using secondary sources is needed and information on the accompanying OCR resource sheet.

D, E, F, G Many students still did not consider preliminary work. In many cases, preliminary work was not justified or related to the main method of the investigation. Preliminary work must inform the main method in future. Examples could include: extraction technique (maceration/filtration); mass of original tissue to be used; age; source of tissue; controlled variables; recognition of end point.

H,I Many candidates listed at least two secondary sources. Candidates must ensure that full reference details are given and they must state how these sources have helped in the investigation to gain criterion 'I'.

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 K. Some students failed to appreciate that their method should be comparative.

L,M Students need to give qualified names and quantities for M.

N Students need to appreciate the importance of repeats and the need for experimental data to be comparative.

O,P Very few stated the reason for having a range. The majority of students appropriately stated the three tissue types as their range but did not relate this to the information in the insert and/or their prediction.

Q,R Whilst many students stated a minimum of 3 variables as dependent, independent and controlled variables, very few students explained how the controlled variables were to be controlled.

S Many students planned to tabulate their data in a suitable format. However, units of measurements must always be included in the headers.

T Many students planned to display their results graphically as a bar chart. Some went as far as rates of reaction and the use of calibration data to calculate enzyme concentration.

U Means and % change in mass were the most common calculations seen in scripts.

V Few students addressed possible conclusions. Those that did failed to link possible conclusions to confirm or reject their prediction.

W Some students were able to recognise one possible source of error in their equipment. Two are needed to award this marking point.

X Many candidates were able to suggest at least one possible method to improve the validity of their data (usually by suggesting an alternative method). However students need to distinguish the difference between the terms accuracy and validity to enable suitable improvements to be suggested in future.

Y Very few candidates failed to use scientific terminology appropriately.

G623/02: Cells and Molecules

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 The majority of candidates could access this question. Many scored 6 marks out of the seven. However, very few gave more than one response to 'visible using a light microscope'. Students must ensure that they read and understand the question stem in future.

2 (a) Centres have clearly taken on board, previous examiner comments with regard to food tests. More students could correctly state the reagents for starch, protein and lipids, together with the result if the food is present. Few candidates could name all three reagents needed for a non-reducing sugar test. However it was still noticeable that whole entries from a few Centres failed to access this material to gain marks.

(b) Many students had learnt about the biochemistry of carbohydrates and scored 6 marks in this section. Weaker candidates had difficulty completing diagram B and confused maltose with sucrose in (b)(iii).

(c) Students who had learnt about the biochemistry of lipids had little difficulty with this section. However, very few candidates recognised that lipids with more than one double bond are called poly-unsaturated fats.

3 (a) (i)(ii) The majority of students were able to complete (i) and (ii). However, students need to be watchful and label structures with a clear label line.

(iii) Most students could measure the diameter of X although many candidates failed to obtain the first marking point for a correct substitution. More able students indicated the conversion factor of mm to μm.

(b) A wide range in the quality of responses was seen in this section. Many students scored 2 to 4 marks. However, the order in which the method was presented was often incorrect and incoherent. Consequently, often the QWC mark for 'order' was not awarded.

4 (a) Many students failed to recognise and outline the nutritional problems of CF. Many discussed respiratory problems in their answers. Those that did focus their response on the question stem often scored their marks for referring to enzyme content of pancreatic juice, impaired digestion and the appearance of diabetic symptoms. Very few candidates gained full marks on this section of the question.

(b) Majority of students scored 2 marks in this section.

G627, G629, G630, G631, G632, G633, G634: A2 Portfolio Units

General Comments

This is now the third assessment session for this A2 qualification. Entries covered the following portfolio units

- Unit 8 Investigating the Scientist's Work
- Unit 10 Synthesising Organic Chemicals
- Unit 11 Materials for a Purpose (limited entry)
- Unit 13 The Mind and the Brain
- Unit 14 Ecology and Managing the Environment
- Unit 15 Applications of Biotechnology

Centres again were very responsive in returning scripts for moderation and where there was low entry it was appreciated when centres sent all scripts directly to the moderator; this saved time and led to an efficient moderation exchange. It was felt that centres now have a good understanding of the assessment criteria and work seen was well organised and clearly annotated with the assessment criteria codes. It is extremely useful if centres can try and help moderators locate the work by indicating the assessment code e.g. AO1 (a) and even better if they can indicate the mark band on the actual candidates' work.

Centres are again asked to include the tasks sheets given to the candidates as this helps to support the moderation process, very few were seen.

In the majority of centres candidates' work was at an acceptable standard for A2 level. Limited scaling of Centres did occur but this was where the work submitted was not at an appropriate level for the A2 requirements of the assessment criteria.

Candidates' portfolio work at this level showed a marked improvement in research skills, evidence of independent working and more selective use of the internet. This is a credit to both the Centres and their candidates.

Unit 8 Investigating the Scientists' work

This is a mandatory unit and forms part of the synoptic assessment for both the single and double A level qualification. Centres need to ensure that the investigation chosen by candidates builds on work studied at AS level. A good range of different investigative work was seen which included redox, food analysis, vitamin C in a range of food products and drinks, yeast /sugar/fermentation, health and fitness, effects of stimulants, energy drinks, caffeine etc. on performance.

Candidates generally are now producing full holistic plans, which include a detailed log of the full investigation with the appropriate monitoring for AO3. AO1 however should include evidence of both scientific principles and details of a range of experimental techniques. Some candidates tended to be quite repetitive in their chosen experimental work. A variety of different techniques is preferred. Predictions are not needed in this investigation, the aims and objectives of the investigation are needed and some vocational links are required.

Risk assessments need to be included with all experimental work to fulfil the Health and Safety requirements. Mark band 2 AO1b needs to show evidence of a range of relevant research with information on why this has been chosen with statements to support its validity. Mark band 3 needs to also include constraints that the candidates are working to with suitable contingency plans.

Centres need to ensure that the investigations chosen by the candidates do include suitable A level experimental work and do give the candidates the opportunity to use equipment that will provide suitable accurate data. Care needs to be taken that candidates complete suitable A2 practical work .Centres are encouraged to include evidence that candidates had actually carried out the practical work with further evidence that they had completed and used risk assessments. A statement written on the candidates' work is sufficient or alternatively a certificate of completion of practical. A write up of the method etc is not evidence that the candidates have completed the practical. The report does not necessarily need the candidates to include write ups of methods. A standard procedure which was used can be attached. The report needs to show the outcomes of the investigation with suitable evidence of an understanding of the scientific concepts involved. Centres also need to ensure candidates to relate the outcome to the original aims of the investigation. Evaluations need to focus on the whole investigation not just single experimental tasks.

Unit 10 Synthesizing Organic Chemicals

Work moderated indicated that candidates are now acquiring good research skills and are able to select material. Work seen for AO1 was now focused on the requirements of the specification.

For AO1a good summaries of classification and identification of functional groups were seen with evidence of understanding the different type of isomerism, although the importance of isomerism linked to specific examples is really needed to secure mark band 3.

Candidates now seem to be showing suitable understanding of the detail needed for AO1b. This covers a huge amount of organic chemistry – selected but accurate information again is needed for mark band 3. Pages of copied information are not now being seen.

Some excellent work has been seen for AO1c. Good practice is shown where candidates complete work in a table form: suggested headings could be Type of drug/How it is used/example/importance in health care /further information. More detailed information however on therapeutic effects and the use is needed to support mark band 3.

AO2 work is possibly the weakest area although some good work was seen on the manufacture of ibuprofen. AO2b needs to focus on costs and benefits to individuals, companies and society associated with the manufacture of the organic compound. Alcohol production is also another example which could be used.

Preparations of aspirin, ethanoic acid, iodoform (triiodomethane) and paracetamol were seen. Candidates need to take care that for mark band 3 risk assessments are accurate and sufficiently detailed. Risk assessments tended to be mark band 2 rather than mark band 3. Candidates need to be guided to ensure they record suitable observations for both their preparations and the processing of results is recorded and completed to a sufficiently high level. Evidence on calculations of theoretical yield is needed. Evaluation of the process again needs to be detailed and focused on the techniques used, sources of errors and reaction route.

Unit 13 Mind and the Brain

Work seen for AO1 showed that candidates are now learning how to use the internet and are showing selection and use of suitable material. Care needs to be taken to ensure that the work is presented as fact sheets and not reports.

AO2a again allowed candidates to research the clinical methods of studying the brain and interesting work was seen. Diagnosis of brain diseases was generally well covered and some

good illustrations supported the candidates' work. Work seen for this session tended to be mark band 2.

AO2b moral and ethical implications of brain research still needs to show evidence of suitable discussion by the candidates; although some good arguments were given from some candidates.

AO2c does ask for a fact sheet detailing statistical evidence. Candidates are using a wide range of statistical testing on their results but additional information is still needed to ensure the higher mark bands.

Experimental work on a cognitive function generally was suitably covered and assessed. However, Centres need to note that 26 marks are available for this section and therefore candidates need to spend the appropriate time in their experimental work. AO3e for mark bands 2 & 3 care needs to be taken to ensure the requirements of the criteria are suitably covered.

Unit 14 Ecology and Managing the Environment

Several candidates produced high quality work which reflected suitable coverage of Mark band 3 requirements and this was good to see. Again candidates' work indicated interest and enthusiasm in this topic area.

AO1 work is showing suitable selection from researched material and work which indicates candidates are understanding ecological succession and the effects of change on ecosystems and biodiversity.

Centres which gave candidates structured assignments focused on the requirements of the assessment objectives allowed them to produce logical and relevant work which gave access to the high mark bands.

AO1b research on the effect of agricultural practice, human habitation and greenhouse gas production on ecosystems and biodiversity was also extensive where candidates had been given the appropriate guidelines and support. It needs to be noted however that for mark band 3, evaluative work and justification on the choice of material needs to be included.

AO2b Candidates needed to include data / information which related to the success of project managing one ecosystem. Information on the methods used was often included but the data relating to the success of the project often omitted.
Calculations were usually linked to data gathered from practical work carried out. Centres need however to ensure that if they are going to use this, suitable opportunities are given for candidates to collect quantitative data. Some good statistical analysis was seen in this section.

Practical work was wide ranging and included investigative work based around candidates' school or college or field trip work. A range of experimental techniques were seen and it was good to see photographic evidence of work carried out.
Risk assessments for this session generally seemed to be suitably detailed and did include the risk out in the field as well as back in the lab.

AO3c the displaying of data needs to show a range of different ways for mark band 2. Kite diagrams were often seen to support data display.
Conclusions at mark band 3 must show suitable interpretation of results and be related to the occurrence and distribution of species within the ecosystem studied.

Unit 15 Applications of biotechnology

Entry was limited this session. Moderated work indicated Candidates produced work which showed good research skills and investigative practical work.

Booklets produced for AO1 showed a variety of information on the science of genetic engineering and the use of recombinant DNA technology. Quantity does not necessarily mean high marks can automatically be given. Work for the higher mark bands should not be sections just cut and pasted from the internet but show suitable selection and use of the researched information.

AO2c mark band 2 work on moral, ethical and environmental issues concerning the use of recombinant DNA technology in the production of GM plants needs an explanation of two types of controls placed on scientists that work in this field. Mark band 3 however needs a more detailed report with additional explanations and evaluative work on the two types of controls placed on scientists and how effective they are.

For AO3 suitable practical work was seen but still plans need to be clearer. Preliminary work from candidates was included and in some scripts there was good research work on enzyme activity. Evidence of good displays of results need to be included for AO3c. Conclusions and interpretation of results are still basic and candidates need to check they spend the appropriate time on AO3c and AO3d to ensure sufficient coverage. For AO3 d level 2 candidates need to check that as well as interpretation of results and basic conclusions, the advantages of using bioreactors and enzyme immobilisation are included.

G628: Sampling, testing and processing

General Comments

This was the second time that this paper has been taken in the winter and the number of candidates taking the examination was around 300, about 20% more than in January 2007.

The total for the paper was 90 and, as in January 2007, there were many papers that showed a score of between 30 and 50. Fewer candidates scored in the fifties and sixties but sadly, there were a number of candidates who only scored marks here and there and whose total marks sometimes did not attain double figures.

In January 2007 the report commented that 'a number of the candidates with low scores, produced papers showing that they had not really used the case study material adequately in their preparation'. However, the examiners felt that, in this examination, more use had been made of the case study material. As a result fewer irrelevant responses were seen.

Question three, which was not based on case study material, was by far the weakest in terms of candidates' responses. Many candidates seemed to be unfamiliar with the basic laboratory processes of separation and heating. Too often, flammable liquids were heated directly by the use of a Bunsen burner.

In previous examinations, comment has been made about the two main weaknesses seen in a number of papers, and the same can be said of this paper too. One fault appears to be that many candidates do not read the questions carefully enough and answer what they think the questions is asking. This is an A2 paper and the question stems need to reflect, in some places, the higher level of understanding required. All too often the answers given, although, in themselves expressing correct science, did not answer the question posed.

The examiners felt that the level of mathematics shown in this paper had improved when compared to the two previous papers. However, a number of candidates still cannot handle graphs adequately or mathematical systems requiring staged answers.

Evidence showed that few candidates were pushed to finish the paper in the time available and the examiners thought that the lack of response in some parts of question three was due to lack of knowledge rather than time restraints.

On balance the examiners felt that this paper had worked well and they were pleased to read a number of good papers where candidates were able to demonstrate their knowledge and understanding, and who were then able to apply it to new situations.

Comments on Individual Questions

1 This question was based on the article 'Arsenic contamination from a mine in Northern Spain'.

(a) Some candidates did not know the meaning of the word 'homogeneous'.

(b) (i) The questions asked which results were the most valid. A number of candidates did not realise that they should consider the area that had the most samples as their answer.

(ii) Many good responses were seen, with detailed sketches illustrating their answer.

(c) (i) The examiners expected some method for producing a hole and some reference to the depth required. Not all candidates gained both these marks.

(ii) Surprisingly few candidates stated that the concentration of arsenic may have varied with depth.

(d) (i) The most common correct responses were location, date or a hazard warning label.

(ii) A number of correct responses concerned with storage were given, but few candidates could express themselves clearly enough to gain both marks.

(iii) Nearly all candidates realised the need to remove contamination.

(e) (i) Although many good lines of best fit were drawn, a number of candidates did not draw their line through the origin. If there is no mercury then the absorption value must also be zero.

(ii) Nearly all candidates could read off the value from the graph.

(iii) Very few candidates realised that the answer to this question was five times the response to (ii), as the mass had been increased from 200 g to 1 kg.

(f) (i) This was a discriminating question. Only stronger candidates mentioned the need to have the results in a numerical order and have the mass of the sample as the left hand column. There were other acceptable responses but it was uncommon for a candidate to gain both marks.

(ii) Here too, it was uncommon to award two marks. The most common correct response was to suggest that all the masses were in the same units.

(g) It was clear that some candidates had researched the merits of ICP-ES and could give sound correct answers. For others it was largely a matter of guesswork.

(h) This question concerned precipitation and subsequent filtering. For some this seemed to be an unfamiliar procedure.

(i) A number of candidates did not realise that powdering the sample enables easier solution of the soluble material and a faster reaction.

(ii) The need for a risk assessment was a straightforward mark for many.

(ii) The need for the washing of filtered solid material to remove the final traces of soluble compounds was seldom given.

(iv) Very few candidates realised that the mass of the empty crucible had not been given.

(v) The need to filter again gained a mark for most candidates.

(vi) The question stated that MAA decomposed on heating. Too many candidates then dried the compound in the oven, instead of at room temperature!

(vii) This was an easy sum but many did not give their answer to three significant figures as requested.

(viii) Weighing very small quantities can cause problems with accuracy. Few candidates managed to state this with clarity.

2 This question was based on the article 'Jute – a fibre with a thousand uses'.

(a) Most candidates realised the need to test the quality of the jute.

(b) (i) The need for representative sampling was well known.

(ii) Some candidates did not realise that the question referred to the bales of jute and gave a more general, but unacceptable, response.

(c) The article indicated that the jute should be stored dry and away from insect pests. Some candidates gave the conditions in which jute is grown, which was not required.

(d) (i) The question asked candidates to design an experiment to test the stretching of jute fibres as masses were added. Very few candidates were able to gain more than half marks for this question, where it was essential to be precise about controls and accurate measuring.

(ii) Often candidates gained two of the three marks here and had obviously thought about the need to make the statement more scientifically meaningful.

(iii) The way to treat anomalies was clearly understood.

(e) Most candidates knew the meaning of 'synthetic' but there was a lack of clarity about 'biodegradable' and few knew the meaning of 'matrix', although this was mentioned in the article.

(f) It was surprising how many papers revealed that the meaning of photosynthesis was unclear.

(g) Some candidates did not read the question carefully enough and gave related, but incorrect, responses when asked for three factors to consider when testing the effectiveness of the insecticide.

(h) (i) Some candidates thought carbon dioxide was very toxic, and this was the reason why a fume cupboard was used.

(ii) It was unusual to see all three marks gained in this calculation. Too many candidates gave cm^3 as a unit of mass. Only the better candidates could give correct responses here.

(iii) This was a question about the scaling up of a laboratory method. Candidates find this type of question quite difficult and should refer to the mark scheme and to past papers for the correct type of answer required. There were too many silly responses, such as using huge beakers and giant Bunsen burners!

3 (a) (i) The need for mixing was usually well expressed.

(ii) 'Heating it' was the usual response, although 'leaving it for longer' was equally valid.

(iii) The question implied that the use of a fume cupboard and 'no naked' flames' were the responses required, and these were given by most candidates. The use of gloves and laboratory coats was felt to be inadequate.

(iv) This was another question that required candidates to think out a method. Again, most responses were poor and did not really address the question.

(v) Propanone was the solvent used but few used this in the cleaning procedure. Too often, water (not effective) was used and the apparatus was left wet.

(vi) Many adequate, but poor, sketches were seen and usually credited with two or more of the marks available.

(vii) Nearly all candidates realised that wood pulp was easily available and was a renewable resource.

(b) (i) The question stated the volume of materials used but few candidates used vessels large enough, even though the question clearly stated that the sizes were required.

(ii) The use of sintered glass was the usual acceptable response. The examiners thought that vacuum filtration was not a valid answer.

(iii) The response – washing or cleaning – was an easy mark for nearly all candidates.

(iv) The question seemed to be poorly understood by many candidates. All that was required was for it to be left longer, with an explanation.

(v) This was often very poorly answered. The question gave candidates a chance to consider controls and variables but these were often ignored.

(vi) Many candidates did not refer to the instructions when answering this question, with obvious consequences, in terms of marks.

(vii) It was disappointing to see how few candidates could describe how a reflux condenser worked, but most gave an adequate reason for the need for electrical heating.

G635: Working Waves

General Comments

The examination discriminated well between candidates. For each of the application areas tested some candidates demonstrated effective learning.

The quality of work seen was much improved in comparison to that submitted in June 07.

Candidates appeared to have had adequate time to complete the paper and attempted most of the questions, with few no-responses.

The majority of low-scoring answers were full and addressed the question sensibly, failing to score through a weak grasp of the required scientific principles; contextual understanding was generally good and attempts were often seen to describe scientific information relevant to the context if not the question.

Comments on Individual Questions

1 (a) Performance was mixed. Some failed to recognise that there must be a difference in temperature and hence intensity/wavelength emitted for an image to be formed. It was not sufficient just to say that the liquid gives off infra red radiation. The word heat was very frequently used to mean temperature.

(b) Some valid applications of thermal imaging were doubtful as preventative maintenance, but on this occasion a broad interpretation was allowed for marking enabling candidates to score at least some marks. Answers were often too vague to score full marks and had no obvious connection with temperature.

(c) (i) The great majority of candidates correctly deduced a 2-sf number from the graph, but had difficulty in converting from nm to m.

(ii) The great majority presented some form of the equation and the correct unit but relatively few rearranged and substituted correctly. Most lost the mark for giving the answer to 2 sf., some answering to two decimal places. Those unable to carry out the calculation often knew the correct unit. A minority gave m/s.

(iii) A surprising number of incorrect answers. A number of candidates stated that light cannot travel through a vacuum.

(iv) There were slightly more wrong answers than correct ones. Answers suggested that candidates were aware of the electromagnetic spectrum but had been unable to apply their knowledge correctly.

(d) The spectra were usually positioned correctly above or below that of the bulb, but the peaks were most frequently drawn above each other. A minority correctly identified the shift in the peak wavelengths, but more often the three peaks were in a vertical line.

2 (a)(b) Some candidates scored marks by reproducing diagrams, but few candidates could describe what is meant by polarised light, with many misunderstandings based on light travelling in different directions and on use of colour filters.

(c) Almost all candidates were able to correctly identify the correct image and explain how they did this. Few were able to state or explain how rotation of the Polaroid filter affects the pictures.

(d) Although more than half the candidates scored at least one mark in each subsection and usually back this up with a justification. A surprising number apparently guessed the answer.

3 (a) Most candidates gave at least one correct answer. Common errors included copper and other metals.

(b) A number of candidates identified total internal reflection, but further explanation was disappointing.

(c)(d) Mixed response.

(e) Candidates were less well able to explain the finer details of alternative types of optical fibre.

(f) Most candidates made a reasonable attempt, indicating that they had carried out this experiment. Accuracy of detail varied. Critical angles were sometimes shown outside the block and incorrect bending of rays within blocks was regularly seen.

4 (a)(b)(d) Performance was mixed. A number of candidates had clearly studied the subject but there were some imaginative guesses also.

(c) Generally well answered. Weaker answers focussed on the damage caused to the body (diseases) rather than to the cell.

(e) Correctly answered by many but not all candidates.

5 This was the best-answered question.

(a)(b)(d) Generally well answered, the best candidates achieving full marks. Some thought that CAT scanners do not use X rays.

(c) Only a sizable minority mentioned ionisation, but otherwise some good points made.

(e) Some candidates had failed to correctly read the words ‘medical’ and ‘non-diagnostic’ in the question. Otherwise some good answers.

Grade Thresholds

Advanced GCE Applied Science AS (H175, H375) and
GCE Applied Science A2 (H575, H775)
January 2008 Assessment Session

Portfolio Unit Threshold Marks (AS)

Unit		Maximum Mark	a	b	c	d	e	u	Total nos of cands
G620	Raw	50	41	36	31	26	22	0	499
	UMS	100	80	70	60	50	40	0	
G621	Raw	50	42	37	32	27	22	0	327
	UMS	100	80	70	60	50	40	0	
G624	Raw	50	40	35	30	25	21	0	106
	UMS	100	80	70	60	50	40	0	
G625	Raw	50	40	35	30	25	21	0	81
	UMS	100	80	70	60	50	40	0	
G626	Raw	50	40	35	30	25	21	0	103
	UMS	100	80	70	60	50	40	0	

Examined Unit Threshold Marks (AS)

Unit		Maximum Mark	a	b	c	d	e	u	Total nos of cands
G622	Raw	90	70	61	52	44	36	0	985
	UMS	100	80	70	60	50	40	0	
G623	Raw	90	73	64	55	47	39	0	155
	UMS	100	80	70	60	50	40	0	

Portfolio Unit Threshold Marks (A2)

Unit		Maximum Mark	a	b	c	d	e	u	Total nos of cands
G627	Raw	50	40	35	30	25	20	0	87
	UMS	100	80	70	60	50	40	0	
G629	Raw	50	41	36	31	26	22	0	38
	UMS	100	80	70	60	50	40	0	
G630	Raw	50	40	35	30	25	21	0	13
	UMS	100	80	70	60	50	40	0	
G632	Raw	50	40	35	30	25	20	0	19
	UMS	100	80	70	60	50	40	0	
G633	Raw	50	40	35	30	26	22	0	52
	UMS	100	80	70	60	50	40	0	
G634	Raw	50	40	35	30	25	20	0	12
	UMS	100	80	70	60	50	40	0	

Examined Unit Threshold Marks (A2)

Unit		Maximum Mark	a	b	c	d	e	u	Total nos of cands
G628	Raw	90	58	52	46	40	34	0	308
	UMS	100	80	70	60	50	40	0	
G635	Raw	90	65	57	50	43	36	0	221
	UMS	100	80	70	60	50	40	0	

Specification Aggregation Results

Uniform marks correspond to overall grades as follows.
Advanced Subsidiary GCE (H175):

Overall Grade	A	B	C	D	E
UMS (max 300)	240	210	180	150	120

Advanced Subsidiary GCE (Double Award) (H375):

Overall Grade	AA	AB	BB	BC	CC	CD	DD	DE	EE
UMS (max 600)	480	450	420	390	360	330	300	270	240

Advanced GCE (Single Award) (H575)

Overall Grade	A	B	C	D	E
UMS (max 600)	480	420	360	300	240

Advanced GCE (Double Award) (H775)

Overall Grade	AA	AB	BB	BC	CC	CD	DD	DE	EE
UMS (max 1200)	960	900	840	780	720	660	600	540	480

Cumulative Percentage in Grade

Advanced Subsidiary GCE (Single Award) (H175):

A	B	C	D	E	U
0.0	3.7	40.7	81.5	92.6	100.0
There were 28 candidates aggregating in January 2008.					

Advanced Subsidiary GCE (Double Award) (H375):

AA	AB	BB	BC	CC	CD	DD	DE	EE	U
0.0	4.4	4.4	13.3	24.4	40.0	57.8	75.6	95.6	100.0
There were 46 candidates aggregating in January 2008.									

Advanced GCE (Single Award) (H575):

A	B	C	D	E	U
0.0	0.0	0.0	0.0	0.0	100.0
There were 0 candidates aggregating in January 2008.					

Advanced GCE (Double Award) (H775):

AA	AB	BB	BC	CC	CD	DD	DE	EE	U
0.0	0.0	0.0	0.0	0.0	33.3	33.3	66.7	100.0	100.0
There were 3 candidates aggregating in January 2008.									

For a description of how UMS marks are calculated see:
http://www.ocr.org.uk/exam_system/understand_ums.html

Statistics are correct at the time of publication.

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