GCE

Report on the Units

January 2008

CONTENTS

Advanced GCE Human Biology (7886)

Advanced Subsidiary GCE Human Biology (3886)

REPORT ON THE UNITS

Chief Examiner's Comments

Great care is taken to ensure the comparability between GCE Human Biology and GCE Biology. The standard of response required by the mark schemes was in close alignment between the two routes. This of course means GCE Human Biology will never be 'an easier route' and ensures candidates gaining success in Human Biology have earned a qualification of equal value to Biology. Centres should be aware that, with this in mind, the entry criteria they employ for the two courses should therefore be broadly similar.

As has been reported before in the Chief Examiners comments, this examination series saw an increase in entries at AS and A2 in Human Biology. This shows that the specification continues to be well received and indeed all the indication is that the new specification will be able to build upon the successful elements of the current specification. Centres are continuing to deliver the context-based aspects true to the aims of the specification and this was seen in particular in 2856 when several candidates were able to name (correctly) an unknown molecule referred to only as **Z** in the question stem of Q2. It is worth observing that this did not in any way give these candidates an unfair advantage in responding to the question.

The A2 units in this specification both contain synoptic elements. This series saw a significant candidature sit 2866 and the examiners of this unit reported that candidates faired particularly poorly on the synoptic questions. Q2(b) and Q3(a) are good examples of questions which candidates found particularly difficult. Centres are reminded that although the content for 2866 is significant, some teaching time should be devoted to ensuring candidates are still as conversant as they can be with the synoptic material.

The cohort for AS Human Biology included many candidates resitting from previous sessions (especially for 2857 and 2858/01). This strategy is well informed as it allows candidates to improve their UMS scores. There was, however, evidence that many of these candidates did not show improvement – especially those from the weaker end of the ability spectrum.

This series saw many responses that had a "GCSE level" feel to them. Centres are advised to work with candidates to make clear the standard of responses required to be awarded marks at GCE AS and A2 level.

Weaker candidates continue to struggle with their use of written English. The examiners see clear evidence that many candidates have as much difficulty comprehending the questions and conveying their response in written English as they do in actually coping with the Human Biology content. Centres may well wish to explore how their teaching schemes can be adapted to maximise the delivery of literacy skills.

> **Teaching tip**
>
> Key terms and definitions can easily be recapped with matching exercises. To increase the learner engagement in such activities, a number of distractors can be used. Distractors should be carefully chosen to ensure they do not cause candidates to remember the wrong answer instead of the correct response.

Understanding the questions

As an A level science, Human Biology questions are written in a clear but somewhat technical way. Candidates need to develop the ability to use the stimulus material judiciously and to respond to the actual questions that are asked in order to succeed.

> **Teaching tip**
> Encourage candidates to develop study skills by incorporating generic skills training into teaching schemes. Geoff Petty has developed some excellent freely available resources to this end (http://www.geoffpetty.com/genericskills.html)

In this series, candidates found questions that required lateral thinking particularly difficult. There was some evidence that candidates had learned previous mark schemes. Although this strategy enables weaker candidates to gain confidence that they are operating at the correct level of detail, it can in no way substitute for a thorough understanding of the topics involved.

There were instances where candidates did not always read the questions properly or refer to the figures or data provided. Candidates in some instances showed evidence that they had failed to read prompt material even when it was essential for the proper understanding of a particular question.

> **Teaching tip**
> As this specification is now established, there are more past papers available than before. These can be used to help students develop the reading and comprehension skills required. Attention should be given to training students to follow rubrics and command words.

Information, Figures, Tables and Graphs

In general, this session, the data questions were handled well by candidates. Candidates were able to describe patterns of data shown in graphs well. A common weakness was a failure to refer to the steepness of curves increasing and decreasing.

> **Teaching tip**
> Teachers would be well advised to encourage candidates to practice skills such as describing the data shown by graphs in writing.

Mathematical requirements

The summer series of 2007 saw the mathematical questions being answered better than in previous series. This series, unfortunately, saw the standard fall again. Centres are reminded that the scope for setting calculations is broad in context but limited in the actual maths required. Therefore, it is well worth ensuring candidates have practised examples of the most common types of mathematical questions.

<table>
<tr><td colspan="2">**Teaching tip**

Teachers may wish to consider producing a student checklist based for some of the different types of calculations that are regularly used in questions.</td></tr>
</table>

Mathematical skill	*Competence achieved (✔)*
Successfully carry out magnification calculations	
Successfully carry out percentage increase calculations	
Successfully calculate ratios	

There were two straightforward magnification questions this series. These were in 2856 (Q4(a)(ii)) and 2866 (Q4(a)(ii)). Centres should continue to make candidates aware that these scaling questions can be set on any of the modules of this Human Biology specification.

Presentation

Diagrams are acceptable parts of a candidate's response but when used they should **always** be labelled. Surprisingly, even when the question stated that labelled diagrams could be used, some candidates still failed to label their diagrams.

Bullet points are an acceptable strategy for answering some questions, but the meaning of what is written should be clear, rather than a simple list of one or two-word statements.

The language of written responses for the longer questions at times led to candidates failing to score marks even when the examiners felt that the candidates probably knew the biology required. An examiner can only give credit for what is presented to them. It is therefore important that candidates can communicate their ideas in an appropriate level of detail. Examiners reported (from all the examined units) that candidates continue to lose marks from responses that are too vague to be awarded marks at GCE AS and A level.

INSET

OCR is offering a full programme of expos and training events to introduce the new GCE A level specifications for first teaching September 2008. Further details are available from the OCR website www.ocr.org.uk .

2856 Blood, Circulation and Gaseous Exchange

General Comments

Candidates achieved a wide range of marks for this paper. This unit was the first AS examination that many candidates would have taken and in many cases this showed in the quality of responses to the questions. Unfortunately, the examiners found that too many candidates were unable to answer many questions with the level of detail required to score marks at AS level. In addition, other questions revealed many cases where candidates were unable to correctly link facts. This was seen particularly in Q5 where many candidates clearly knew some facts about lung disease but did not know which facts should be associated with each disease listed in the specification.

Those candidates that were able to answer the questions with AS level detail almost universally achieved high marks and the teaching of this unit had clearly prepared these candidates well. There was no evidence that candidates were running out of time in the examination.

Human Biology candidates generally find it difficult to apply their knowledge to unusual, novel questions and the lateral thinking required causes problems for many. Questions 5 (d)(ii) and 6 (c) exemplifies this.

The long-answer question was well answered by most candidates. It was apparent that some centres had not covered CHD in the detail required by the specification and some responses focused too much on generalities rather than the specific detail required. Centres are reminded that this question papers regularly test the procedures detailed in the specification and candidates should be prepared on all of them.

> **Teaching tip**
> This unit has a very extensive list of testable procedures. It would be useful to encourage students to take ownership of their own learning and to mark off each procedure when it has been covered and produced their own bullet point outlines for each procedure in the specification.

Comments on Individual Questions

Q1   Most candidates were able to access this question which was pleasing as the biological molecules topics are not always well understood by human biologists.

    (a)   **(i)** In general, candidates either knew the correct answers or did not. There was no clear pattern to wrong responses.

           (ii) The most common incorrect response to this question was to assume that the amino acid contained peptide bonds.

> **Teaching tip**
>
> It is worthwhile teaching students to be able to match up the bonds with the molecules they hold together both by name and by picture.

(b) **(i)** As the questions asked for organs that store glycogen, a named muscle or the heart as an organ primarily composed of muscle were the expected responses. The generic response 'muscle', although technically a tissue not an organ, was credited by the examiners so as not to disadvantage the candidates. There is a small amount of glycogen present in both the brain and the kidneys – however since these organs do not store much glycogen, these responses were not credited.

(ii) The question clearly asked for <u>structural</u> features of glycogen and there were many good responses to this question. Unfortunately, some candidates (perhaps in the light of mark schemes to similar questions) focused on the insoluble nature of the molecule and how this aided its storage function without discussing its actual structure in much detail.

Teaching tip
Students can find it very difficult to actually read the question that is written rather than a similar question in their heads. This question (b) (ii) could be used in conjunction with the mark scheme in order to highlight the issue.

Q2

(a) **(i)** This was set as an accessible question and the majority of candidates had clearly learned the clotting cascade. Although examiners credited phonetic spelling centres would be advised to adopt strategies which encourage candidates to learn the spelling of technical terms.

(ii) Calcium was the expected answer and over 90% of the candidates gave this as their response. The minority of candidates who did give a different ion usually chose to give Iron or Magnesium as their response.

Teaching tip
If candidates are unsure about the charges on different ions, encourage them to use words to refer to them as they will be penalised in examinations if they give the wrong charge to an ion.

(b) Several candidates could not resist naming Z as antithrombin. However, there was no evidence that these candidates had any advantage over those who did not know this piece of information. There were many good responses that drew information from the diagram and clearly related it to enzyme theory. Some of the weaker candidates were unable to do this successfully and in some cases began to talk about the effect of the enzyme on molecule Z and were unable to earn any credit for this.

The most able candidates often scored all four marks with a few well chosen words.

Q3 **(a)** The endorsed textbook covers this section well and candidates responded well to this question. Some candidates had clearly prepared extremely well for this question and the mark scheme allowed them to easily gain most of the marks available. It was pleasing to see many well ordered responses clearly sequencing the information in a logical way. It was evident that some candidates did not know enough about the topic for such an extended question and tended to repeat themselves several times within their response.

Examiners this session required the location of atheroma to award marking point two. It was disappointing to continue to see many responses referring to atheroma "on the wall of the artery" or "in the artery" or even "on top of the endothelium".

Many weaker candidates did not score marking points 11 – 13 as their responses talked about chambers of the heart being starved of oxygen rather than an area of heart tissue.

(b) The procedure for a coronary artery bypass graft (CABG) is detailed remarkably consistently on all the common medical and general websites (at the time of writing Wikipedia has an excellent section). The blood vessels commonly used for this procedure are from the following list:
- Left internal thoracic artery (LITA) (previously referred to as the mammary artery)
- Right internal thoracic artery (RITA)
- Great saphenous vein from the leg
- Radial artery from the forearm

In the light of this, the examiners were expecting to see "vein from leg" or "artery from chest" as an AS level answer. However this was the exception rather than the rule with the most common response "artery from leg" being used by candidates. This clearly indicates that this area of the specification has not been taught as well as many of the others.

Q4 **(a)** **(i)** Labelling the diagram proved to be very accessible to most candidates. The surfactant or moisture film caused more difficulties than the other two labels.

(ii) This calculation was a standard approach for AS Human Biology. Despite there being many comparative calculations in past papers, it still proved to be difficult for many candidates. Common errors included measuring the whole diagram rather than the scale bar.

Teaching tip
Candidates benefit from practicing all types of calculations in the preparations for their exams. Practice is most effective when it is backed up by reinforcement just before the exams.

(b) It is unfortunate that the words 'membranes' and 'walls' have more than one connotation in AS Human Biology. Many candidates chose the incorrect use of these terms in response to this question. Those candidates who referred directly to the **cells** involved regularly achieved both available marks.

(c) The vast majority of candidates that gave straightforward responses earned both the available marks.

Interestingly, some candidates chose to start from the aspect of plants not having alveoli or capillaries and somewhat missed the point of the question. Plant cells not having Golgi bodies was given as an answer. This response was seen with frequency which implies it is taught in some centres. It is worth noting that plant cells do indeed have Golgi bodies!

Q5 Overall few full mark responses were seen on this question. Even high scoring candidates generally only achieved between 6-7 marks. The majority of candidates scored their marks for sections (a) – (c) of the question.

(a) There were few problems and most candidates were able to offer suitable answers for lung diseases that are linked to cigarette smoking.

(b) The most common answer for a lung disease triggered by allergens was asthma.

(c) Most candidates managed to describe at least one symptom for TB but some answers were too vague. It was necessary to state that any coughing was persistent rather than just 'a lot of coughing'. Some candidates referred incorrectly to the causes of the disease rather than to symptoms and so failed to score any marks for this part of the question. There was evidence that many of the weaker candidates had a degree of confusion between the symptoms of bronchitis, emphysema and TB.

(d) **(i)** Few marks were scored by any candidates on this section. There is a need for students to learn definitions of key terms such as PEFR with regards to lung function measurements.

Teaching tip
With weak cohorts, rather than aiming to teach all the students all the required terms, it may be advantageous to adopt the strategy of ensuring all the students learn one or two terms. The additional terms required can then be used as extension work for those able to cope with learning multiple terms.

(ii) The majority of candidates did not offer any answer which could score marks for this section of the question. The answer required candidates to understand that the damage caused to the lung tissue would leave scar tissue, which then would affect the ability of the lung tissue to recoil. This could be taught as extension when referring to treatment of TB.

Q6 **(a)** Many candidates produced excellent descriptions of the membrane structure and obtained both marks. Several candidates submitted diagrams though many failed to label them. Centres should make candidates aware that all diagrams should have appropriate labelling.

This question highlighted a continuing weakness of Human Biology students. When question requiring what may be deemed to be a generic response (e.g. membrane structure, enzyme function etc.) is set in a specific context (e.g. red blood cell structure) many candidates get caught up in the context and do not provide the required generic answer.

Teaching tip
Examiners will accept a clearly labelled diagram as a response to a question and will apply the mark scheme to such responses. Candidates should be trained to label clearly any diagram they draw in order to get them into the habit of labelling anything they submit in a written examination.

(b) This question discriminated the candidates well and would be a very suitable question to use in the preparation of future candidates. The concept of water potential is crucial to the description of osmosis. Centres should make candidates aware that 'water concentration' is not a term this specification uses to describe osmosis. The examiners shied away from awarding a mark for exploding red blood cells as this was often linked with serious misconceptions such as one response which stated "…would eventually explode due to the hydrogen in water".

(c) **(i)** The context of this question was not intended to be too complex for candidates to access the question. However, few were able to successfully integrate the information in the question with the fundamentals of membrane transport.

(ii) The key to this final question was for candidates to link the limited number of proteins with a limit to the rate at which glucose can be taken up. The candidates that were able to do this tended to be the most able.

2857 Growth, Development and Disease

General Comments

This paper proved to be accessible to the majority of candidates and produced a wide range of marks. Some candidates found some of the questions difficult and this was usually centre-dependent. Many candidates read the questions carefully and focused their answers on the question asked, although some candidates wrote at length on details not specifically required by the question. This was particularly the case with question 3(d) and 4(c).It was pleasing to see an improved response to questions on the nutritional requirements of the developing embryo and foetus.

Comments on Individual Questions

Question No

1 **(a) (i)** A pleasing number of candidates calculated the percentage correctly and gave the answer to the nearest whole number. However, some candidates lost one mark by not giving the answer to the nearest whole number and others clearly did not know how to calculate a percentage.

(ii) Only a few candidates answered this completely correctly. The most common mistake was to give answers based on the stages of mitosis, either because the question had not been read correctly or the reference to the cell cycle had not been understood.

(b) (i) Most candidates gained this mark by correctly naming the type of cell division as meiosis.

(ii) High scoring candidates gained full marks by correctly referring to the introduction of genetic variation and the need to produce haploid gametes, which fuse at fertilisation to restore the diploid number. However many candidates failed to gain marks because they gave vague answers describing reproduction in general and did not refer to chromosomes or genetic information.

2 **(a) (i)** Most candidates answered this question well. They described the trends shown by the graphical data and used comparative figures to support their answer. A few candidates lost marks suggesting explanations for the trends in the data rather than concentrating on *describing* the trend, as indicated by the command words.

(ii) Most candidates answered this well and were able to suggest two reasons for the trends in the data. The most common answers included: screening leads to more cases being detected at an early stage; earlier detection leads to more successful treatment, and reference to better treatments having been developed.

(b) (i) Although many candidates stated risk factors specific to breast cancer (for example: post menopausal; late menopause; HRT; not having children or not breastfeeding) a surprising number of candidates gave general risk factors such as smoking, UV light, ionising radiation and X-rays, which were not allowed.

(ii) Most candidates answered this well by describing the procedures involved in lumpectomy and mastectomy and referring to the removal of lymph nodes. They also went on to describe some facts about chemotherapy with some mentioning specific drugs such as Tamoxifen® and that the rapidly dividing cancer cells are destroyed. A few candidates lost marks by giving irrelevant comments on the drugs destroying hair cells.

3 (a) There were a few very pleasing answers given to the question with the role of all four nutrients being correctly identified. However many candidates lost marks because they did not know the specific role of vitamin A in the production of the visual pigment rhodopsin and some candidates were not able to describe the role of amino acids in the synthesis of proteins.

(b) Most candidates answered this question well by referring to the use of ultrasound and the measurement of the crown – rump length or biparietal diameter. A few candidates that lost marks had not read the question carefully and wrote about changes in weight of the mother or measuring the circumference of the head with a tape measure.

(c) This question was generally very well answered. Most candidates were able to describe two or three effects of drinking alcohol during pregnancy such as low birth weight, heart defects, brain defects and foetal alcohol syndrome (FAS) and many described how the alcohol was able to cross the placenta and get into the babies blood.

(d) Candidates' responses to this question varied a great deal and tended to be centre-specific. Some candidates gave very good answers and included reference to: how the cells were stimulated to divide by mitosis; that colchicine was added to stop cell division during metaphase; that the cells were put into a dilute salt solution to cause them to burst; that the chromosomes were stained and arranged in pairs and photographed. They then went on to correctly describe Klinefelter's karyotype as having XXY.
However, some candidates misread the question or did not know what a karyotype was. Other candidates misread the question or did not know what was involved in producing a karyotype and just described how amniocentesis was carried out. A few candidates were not specific enough in describing the Klinefelter's karyotype and just stated that having an extra X chromosome would diagnose the condition. A small number of candidates confused Klinefelter's syndrome with Turner's syndrome.

4 (a) Very few candidates got the 2 marks for this question by explaining that an immune response involves the detection of an antigen and the production of antibodies specific to that antigen. Some attained 1 mark for a correct reference to antibodies or lymphocytes. Most did not get any marks because they did not use any immunological terminology.

(b) Many candidates gained at least 4 out of the 6 marks on this question by correctly selecting the words needed to complete the paragraph. A few candidates transposed the correctly selected words and 'cytokines' was the word most often missed.

(c) Only the higher achieving candidates did well on this question. Most marks were obtained by accurately describing clonal selection, clonal expansion and the role of B lymphocytes, including reference to plasma cells, memory cells and a faster secondary response. Very few candidates gained marks by describing the correct role of T killer cells; they were most commonly described as phagocytic cells. Lower attaining candidates showed a poor understanding of the different responses of the immune system and did not distinguish between the body's response to bacteria and cells infected with viruses.

5 **(a)** Most candidates answered this question well, suggesting reasons such as: crowded living conditions, Incidence of HIV, weakened immune system, poor access to healthcare and medicines for the differing incidences in TB in Africa and Europe.

(b) Many candidates gained full marks on this question. They stated that a notifiable disease was a disease that had to be reported to the health authorities.

(c) This question was the least well answered. Very few candidates gained more than 3 of the 5 marks. They gained the marks by correctly describing different responses of bacteria to the presence of antibiotics. Very few candidates were able to describe the sequence of events that leads to populations of resistant bacteria. The expected sequence of events included; bacteria show variation in their resistance to an antibiotics; some bacteria have mutations which make them more resistant; the presence of the antibiotic acts as a selection pressure; the resistant bacteria survive and reproduce quickly; these bacteria pass on the resistant genes to their offspring; overtime this leads to a whole population of bacteria that are resistant to the antibiotic.

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2858/01 Case Studies

General Comments

Candidates entering the exam in the January session can only do so if a course-work mark is carried forward and hence they are invariably re-sitting. This may have been one explanation as to why responses to the question on blood storage (Q2 (f)) contained references to 'buffers' despite the fact that this was not relevant to the question but had appeared on a previous mark scheme.

> **Teaching Tip**
> Although past papers are a valuable teaching tool, avoid encouraging candidates to learn mark schemes. Learning outcomes can be assessed by a variety of questions and marking points relevant to one question may not always be relevant if a different question is being asked.

DNA and protein synthesis are difficult topics but Case Study 1 clearly 'sign-posted' these. It was disappointing that some candidates had clearly failed in their preparation, with some not even attempting the question. Again, the case studies are intended to be stimulus material to be worked on by candidates with guidance from teachers. The fact that the candidates would have been re-sitting may mean that more of them have been left to their own devices. Having said that, some excellent answers were seen, with many candidates scoring maximum marks.

The question on the role of platelets in blood clotting (Q2(e)) proved to be the most challenging one on the paper. Many candidates could describe the clotting cascade but frequently did so with only a passing reference to platelets as 'releasing' calcium ions. Calcium ions are essential for the clotting cascade but they are not released from platelets. The function of platelets is to collect at the wound site and form the 'platelet plug'. The activated platelets then release clotting factors that 'recruit' further platelets. They also release a clotting factor (sometimes called tissue factor or thromboplastinogenase or platelet factor 3). This factor is active in the conversion of prothrombin to thrombin.

The confusion between 'clotting' and 'agglutination' was obvious with the word 'clotting' appearing in Q2 (c) despite the fact that agglutination was specifically mentioned in the stem of the question. This was one of several occasions on the paper where casual use of terms led to marks being lost.

Comments on Individual Questions

1 (a) (i) Most candidates could name the hydrogen bond with 'peptide bond' being the commonest mistake.

(ii) Surprisingly few candidates could link the double-stranded nature of DNA with semi-conservative replication. No credit was given to candidates who identified the two strands as responsible for carrying more genetic information although this idea was credited under the 'four bases'. There was much confusion when candidates attempted to describe the triplet or degenerate nature of the code e.g. 'some triplets have more than one amino acid' or 'each base codes for a specific amino acid'.

(b) Most candidates scored some marks on this question by describing how the mRNA molecule left the nucleus and attached to a ribosome. However, very few candidates recognised that it is a gene that is transcribed – not the whole DNA molecule or even one strand of the molecule. The examiners were looking for the mRNA molecule carrying a complementary copy of a gene from the nucleus to the ribosome. The role of tRNA and the significance of the anticodon was clearly known by many candidates, but again careless descriptions which confused bases with amino acids or did not specify which RNA was being referred lost marks.

(c) (i) While many candidates scored maximum marks here by referring to bases or nucleotides being substituted, deleted or added, others failed to score by either omitting the term 'base' or 'nucleotide'.It was possible to score maximum marks by explaining how a base substitution would result in a different triplet and a different amino acid at that position in the polypeptide chain. No credit was given for references to different amino acids being 'produced'. Descriptions of frame shifts often failed to score by referring to 'every amino acid' being different.

(ii) There were some excellent answers to this question. However, the effects of UV on DNA were described by some candidates who then failed to link the mutation with the development of cancer. Some candidates were confused by the sequence of events and referred to oncogenes mutating to become protooncogenes. As on previous occasions, weaker candidates referred to repressor cells and mutant repressor cells.

(d) (i) Most candidates scored at least one mark by describing a rise in incidence in males. This mark was missed on the whole only by those candidates who misread the question and compared the two curves. Fewer candidates accurately supported this by a data quote with two correct references to the X and Y axes. A surprising number misinterpreted the units and quoted figures such as 600,000. rather than 6 per 100,000. This, in combination with the responses to part (ii) indicates that incidence rates are still only really understood by the more able candidates.

(ii) This was answered well by most candidates with the most frequent references being to females wearing more UV protection or males being more likely to be working out doors and wearing fewer clothes!

(iii) The examiners were looking for the idea that, since population sizes differ, you need to use a standardised unit to compare different populations. But 'practical' suggestions were credited such as reference to making the scale or graph easier to manipulate or the numbers smaller to handle. Some candidates referred to the fact that it made the graph easier to read – having failed to read the graph correctly in part (i). This was not credited.

2 (a) There is still confusion about differences between facilitated diffusion and active transport, with weaker candidates failing to spot that the first term referred to transport against a concentration gradient and hence could not be any form of diffusion. The term 'kinetic' energy also caused problems but the majority candidates scored at least 4 out of the 5 possible marks on this question.

(b) (i) The examiners were disappointed yet again by references to the term 'acute' meaning 'severe', or 'minor' or 'only affects a small area'. This term has been tested in previous sessions but still causes difficulty to a surprising number of candidates.

Teaching Tip
Construct 'pairs' of terms or ask students to construct them. Obvious ones are: acute and chronic, epidemic and endemic, clotting and agglutination, B- lymphocytes and T-lymphocytes, prokaryotic and eukaryotic, transcription and translation etc. Then ask for short explanations of the terms and/or a sentence which use the terms correctly. You could use 'hot seating' with students taking turns to be questioned on pairs that the rest of the group have prepared. This is a good starter or plenary and a great revision tool.

(ii) Many students simply re-phrased the term 'respiratory distress' into 'difficulty in breathing' and gained no marks. Many 'colloquial' terms were used – 'short of breath', 'heavy breathing', 'unable to catch your breath' – and, as the question target was low, these were accepted. Only more able candidates referred to higher breathing rate or nasal flaring.

(iii) This question proved more difficult than anticipated, principally because it was mis-read by some candidates as 'cardiac arrest'. Weaker candidates again simply re-phrased it as 'respiration stops'. The use of the terms 'breathing' and 'respiration' as if they were interchangeable persists from KS3 and candidates are not helped by terms like 'respiratory distress' which really refers to breathing difficulties.

(iv) Most candidates could identify a possible cause of respiratory arrest with choking being the commonest response. This was often described – 'the trachea becomes blocked'. Other responses included drowning or electric shocks. Weaker candidates suggested TB or any lung related disease and these were not credited.

(c) The agglutination of leucocytes in TRALI was described in the case study and in this question, candidates were really being asked to compare this to agglutination of red blood cells – one mark was available if they identified that it was the red blood cells that would be agglutinating with a mis-match of blood groups. However, many candidates referred to 'the blood' agglutinating or, more often, 'the blood clotting'! Reference to the ABO antigens were very rare and only good candidates were able to explain that it would be the donors cells that would be agglutinated by the recipient's antibodies that would already be present.

d) Most candidates scored at least two marks with HIV or HEPATITIS (various spellings!!!) and then identifying discrimination in some form as an issue. However, the command words was 'discuss' and 'issues', and there were 2 marks available so more than one issue was required. The word 'population' was interpreted by some candidates as meaning a 'sub-group' within a larger population. They went on to talk about making assumptions or 'stereotyping' people if only this group was screened and this was credited.

(e) This question was discussed in the introduction.

(f) This proved to be a discriminating question with more able candidates scoring maximum marks. The presence of cells in whole blood and effects of ice crystals in disrupting membranes was most frequently mentioned but the role of mannitol was less widely known with many candidates simply referring to it as a stabiliser or even as a sugar source! It was the final part which proved difficult with relatively few candidates recognising that the platelets would be respiring and that they would need to have access to oxygen and carbon dioxide would need to be removed. Some candidates did refer to bags needed to maintain sterility, but it was worrying to see how many candidates thought the bags would keep oxygen out so they platelets would not be activated.

2866 Energy, Control and Reproduction

General Comments

This session's examination paper performed well overall, producing a wide range of marks. There was no indication that candidates were short of time and the vast majority attempted all sections of the paper. It was pleasing to see that many lower ability candidates gained credit on the question relating to the *significance* of a cycle. Examiners were encouraged to observe that candidates were able to apply their scientific knowledge when attempting this high-targeted question.

Centres should note that many candidates lost marks simply because their statements were, in general, too vague. Candidates should be encouraged to be more descriptive in their answers e.g. candidates should qualify a particular remark by stating that it increased / decreased, rather than just stating 'affects', which can be interpreted positively or negatively. Vague answers do not earn credit as they do not demonstrate that candidates have an understanding of the topic or the processes involved.

Comments on Individual Questions

Q1 The majority of candidates scored well in this question. For many, it was the section involving the pupil response and blink reflex tests that let them down. However, this tended to be due to the vagueness of the candidate's description and not a lack of knowledge, as stated in the General Comments section.

  (a) (i) Most candidates scored at least one mark for correctly identifying the lens in the diagram of the eye. Many correctly labelled the aqueous humour, although some candidates confused the aqueous humour with the pupil. The choroid was correctly identified less frequently. It was commonly identified incorrectly as the sclera. Credit was given for incorrect spellings if the answer was phonetically correct and had no other connotations.

  (ii) It was pleasing to see a number of candidates scoring full marks for this question. The most common incorrect response was stating that the suspensory ligaments 'contract' to alter the shape of the lens. When describing the function of the optic nerve, many candidates used words such as 'images', 'messages' and 'information' instead of impulses. Credit was not given in this instance and teachers should encourage candidates to use correct terminology. A few candidates confused the fovea with the blind spot or thought that it contained rod cells. Otherwise, there were many correct responses. Although the role of the conjunctiva is not stated in the textbook, most candidates gained credit for stating that the conjunctiva was involved in protection. This was encouraging since it is evident that Centres have taken on board previous advice that the textbook should not be used as a substitute for the specification. A variety of educational resources should be used to help provide the candidates with a well founded understanding of the topics outlined in the specification.

(b) (i) It was apparent to examiners that teachers had taken time to go through this procedure with the candidates and, as a result, this question was well answered in general. The majority of candidates gained two marks for identifying that pressure should be placed on the wound and that the leg should be raised above the heart. A few candidates only stated that the leg should be raised but neglected to explain that it should be raised above the heart. Candidates gained credit if they provided further qualification regarding the reason for raising the leg. The third mark proved more difficult for candidates to achieve. Examiners were surprised by the number of candidates incorrectly stating that if there was an object present in the wound, it should be removed.

(ii) In general, candidates did better at explaining the blink reflex test. Most gained two marks in this section. The pupil response test proved to be more difficult. When describing the procedure for the pupil response test, many candidates only referred to the testing and response of one eye. Very few referred to the response of both eyes i.e. that the pupils should react **equally** and credit was not given unless candidates did so.
In both sections, marks were missed by vagueness in interpreting the results of the tests and it was common for candidates to conclude that the patient was unconscious without any further qualification.

(c) A number of candidates scored full marks on this part of the question. Most could name or describe the Snellen chart although there was a great deal of confusion regarding the distance it should be viewed from; Examiners reported candidates' answers ranging from 2 feet to 200 metres!
It was pleasing to see that many candidates could correctly describe 20/20 vision, although, a few incorrectly stated that it was 'perfect' vision.
Very few candidates referred to the procedure used for testing near vision.
Where confusion was seen, it was as a result of candidates incorrectly identifying the test to be carried out and, in most occasions, the candidates described the test for colour blindness.

Q2 The last part of this question was challenging and was targeted at the higher ability candidates. However, Examiners were delighted that a number of lower ability candidates were able to gain some credit for applying their scientific knowledge.
Disappointingly, it was evident that many candidates had a lack of knowledge on the synoptic topic of enzymes, which resulted in many vague statements that were not worthy of credit. In A2, candidates are expected to have knowledge of the topics covered at AS level and should be able to bring together principles and concepts from different areas of the Human Biology specification and apply them in a particular context. Centres might find it beneficial to recap on some of the fundamental areas covered by the AS units.

(a) A high proportion of the candidates gave the correct answer. The most common reason for not scoring the mark was for only stating the mitochondria. Examiners held out for matrix of the mitochondria since the question explicitly asked the candidate to state **precisely** where in a cell the Krebs cycle takes place. Pleasingly, very few candidates placed it incorrectly.

(b) (i) In general, candidates poorly described the enzyme / substrate interactions. There were many vague answers that did not refer in any way to the importance of the shape of the active site. Those that did refer to the shape often only stated that the enzyme has a specific shape. They did not take it a step further and identify that it is the active sites specific shape that is important. Candidates often failed to score even the relatively straightforward mark for stating that only a particular substrate fits. Examiners did try to give credit where possible but it was often too difficult to tease the marks out of the answer. As a

result, few candidates were awarded more than two marks, which was disappointing for this low targeted question.

(ii) This question was targeted at high ability candidates and, as anticipated, it discriminated well. Few candidates correctly named the type of enzyme.

(c) Examiners were delighted that the vast majority of candidates attempted this question. Most gained a mark for recognising that the cycle is continuous. Better candidates went on to state that a constant supply of ATP is made and several made reference to the oxaloacetate being recycled. The examiners did not credit references to energy being 'made' or 'produced'.

Q3 Many candidates performed well on the extended writing section of this question and easily scored full marks. It is evident from both this session and previous sessions that candidates are engaged by the topic of enhancing athletic performance and, as a result, demonstrate a clear knowledge and understanding in this area.

(a) This part of Q3 was generally not well answered. Few candidates made reference to the type of reaction taking place and, unfortunately, many of those that did, confused hydrolysis with the reverse reaction of condensation.
A number of answers incorrectly referred to the stages of glycolysis and the breakdown of glucose as opposed to glycogen revealing a lack of appreciation that the process occurring was glycogenolysis. Glycosidic bonds were often confused with the peptide bonds of proteins.
Some of the more able candidates went on to give detail of the glycosidic bonds and easily scored the maximum number of marks available.

(b) (i) This question earned most candidates full marks. Examiners were delighted that the majority of candidates realised that they were being asked to describe the graph. However, there was a minority that explained the reason for the changes in lactate concentration and provided answers suitable for the next sub-question, rather than *describing* the actual changes.
In quoting figures, few candidates missed out the units found on the graph, which was pleasing. Examiners did notice that a few candidates did not read the scale correctly on the graph and, as a result, could not be credited for the figures they quoted.
Unfortunately, a number of candidates did not take time to read the question correctly and described the differences between the two lines on the graph.

(ii) Many candidates scored well in this question, often making more points than could be credited. Marks were lost for imprecision in answers rather than a lack of knowledge and understanding. This included answers referring to the higher delivery of oxygen to muscles without giving any more detail of how this occurred (e.g. higher oxygen intake, higher heart rate etc.). A number of candidates also stated that maintaining a low exercise rate enabled the body to repay the oxygen debt incurred during anaerobic respiration without stating how this happened.
Many candidates earned the AVP available by identifying that lactate is broken down into pyruvate.

(c)   This was generally an accessible question for most candidates and examiners were delighted by the quality of many of the responses seen. There was evidence of thorough coverage of this area of the specification by many centres and candidates had clearly engaged with the material being taught.

Most candidates were awarded a number of marks in this question. Almost all candidates were able to describe aspects of both steroid and EPO use without confusing the two, with few demonstrating any misunderstanding of what the question was asking for. In addition, the majority of candidates were able to describe the positive effects of enhanced performance and the potential negative side effects for at least one of the substances, demonstrating a more in depth understanding of this subject.

Candidates did understand in most cases that steroids contribute to muscle growth and usually referred to the mental aspects associated with using steroids to gain credit. Better candidates went on to give detail regarding the negative effects of steroid use and often easily reached the internal maximum of five marks for each section.

Many answers were credited with one of the AVP marks available by referring to the onset of male characteristics in females. A number were also able to mention a particular type of steroid used, presumably through high media exposure of such substances.

On the section relating to EPO very few candidates were able to describe the source of EPO as recombinant bacteria, and several confused EPO use with blood doping to increase erythrocyte numbers by infusing previously removed blood back into their circulatory system. Whilst this gives rise to a number of similar outcomes, is not the same as drug abuse. However, credit was given, where candidates subsequently described that this induced increased EPO secretion due to low erythrocyte numbers and marks were awarded for answers that went on to describe the effects an increase in the number of erythrocytes would have on the body.

Most candidates understood that EPO increased erythrocyte numbers, but many lost the mark for linking this to the increase in the oxygen carrying capacity of blood by saying that there was an increase in the amount of oxygen getting to the muscles, but did not make it clear that this was as a result of the blood being able to carry more oxygen.

Statements regarding the improvement in an athlete's performance due to the use of both steroids and EPO were often left unqualified and, hence, did not gain credit.

It was excellent for the Examiners to observe that many candidates demonstrated an understanding that the increase in erythrocytes caused an increase in blood viscosity and that this would lead to clotting and subsequent disorders.

Most candidates detailed that the use of steroids and EPO in competitive sport was against sporting rules, was unfair competitively or various similar wordings to earn credit. Though improvements in performance under both steroids and EPO were often not qualified and did not gain credit.

Q4   This was the most poorly answered question on the examination paper. Examiners found that candidates were unable to use their scientific knowledge to interpret the data and provide explanations for the results shown. Candidates also struggled with the calculation.

(a) (i)   Examiners were disappointed to find that only the higher ability candidates obtained this mark. The majority of candidates simply stated that fertilisation was not complete or had not taken place, which did not earn credit.

(ii)   Few candidates scored full marks for this calculation. A significant number of candidates recognised that they should make a division of the scale bar

measurement by the actual length (15mm / 90), for which one mark was awarded. However, most candidates failed to convert the units appropriately (i.e. 15mm = 15000µm) and so often missed out on the second mark. Candidates and teachers need to appreciate that, in practical aspects of biology, maths is consistently required for calculating concentrations, dilutions and magnifications. The ability to convert between units of measurement (e.g. metres, mm and µm) is a vital tool, and should be considered an essential skill for any biologist. It is can also be tested in any of the units in the Human Biology specification so would be worthwhile for the candidate to know.

(b)   Many candidates scored full marks on this question demonstrating that, on the whole, this topic has been taught well by centres.
It was, however, so disappointing that, even when the terms are correctly spelled out in the stem of the question, some candidates still failed to spell meiosis and mitosis correctly. Examiners did not credit incorrect spellings.
The most common mistake in this question was to incorrectly state that the differentiation of cells from the zygote (2n) to the foetus (2n) was meiotic.

(c) (i)   Examiners were disheartened by the generally poor responses given to this part of the question. The majority of candidates failed to do anything other than re-word the descriptions already given. The most common correct answers explained that the condom was not put on correctly, causing it to tear or split, easily obtaining the two available marks. Examiners were surprised that it was often the lower ability candidates that gained credit for their responses to this question, whilst, many of the higher ability candidates seemed to think they were expected to give a more complicated explanation. Credit was not given simply for stating that the condom was not *used* correctly since this was given in the stem of the question.

(ii)   Since this question was aimed at the higher ability candidates, it was anticipated that the majority of candidates would find it challenging and this proved to be correct. Those that did well generally obtained the AVP by referring to intercourse taking place too soon after a vasectomy and before it had become effective. Unfortunately, most candidates did not further qualify this by explaining that this was because some sperm may remain in the vas deferentia post vasectomy. Worryingly, a significant number of candidates thought that tubal ligation involved inserting or even implanting a tube into a woman's uterus (or on occasions, even their leg / arm).

(iii)   Very few candidates gained the one mark available for this question. On the majority of occasions this was either due to the candidate incorrectly rounding the figure stated in the table (0.3) up and giving 'one' as their answer or failing to round the figure off to a whole number at all.
Unfortunately, very few candidates realised that 0.3 rounds to zero or that you cannot get 0.3 women! Those that did correctly answer this question were spread across all abilities. Any other wrong answers noted by the examiners tended to be any multiple of 3.

(d)   Many candidates scored one of the available marks here for recognising that the antibody action would interfere with the sperm's ability to fertilise the secondary oocyte, for which examiners awarded the AVP mark.
A number of candidates confused the potential for a male autoimmune disease with one where the female produces antibodies against the sperm. This was not the scenario given in the question and so candidates were, therefore, limited to two marks in this instance.
Candidates struggled to score full marks on this question. Frequently, vague

references were made to antibodies 'attacking' the sperm, but no reference to binding, so credit was not given. Additionally, most candidates stated that antibodies 'killed' the sperm directly, rather than marking them for degradation by the immune system, again failing to earn credit.

Maximum marks were rarely awarded, mostly for a lack of scientific knowledge and incorrect use of terms, rather than any misunderstanding of the question.

Q5 The first part of this question proved difficult for some candidates. However, the majority were able to pick up marks in the extended writing section.

(a) A significant number of candidates were able to correctly identify one of the structures form the electron micrograph, although, few scored the maximum of three marks. Structure R (nuclear membrane) was the least well recognised and structure P (chloroplast) was often identified as chlorophyll. Examiners accepted a named part of the chloroplast for P (e.g. thylakoid / stroma / granum).

As stated in previous reports, it is important that candidates have the chance to practice identifying structures from photographs as well as diagrams since examples of both are likely to appear in examination papers.

(b) (i) The majority of candidates gained only one mark in this question. Most were given credit for referring to the chain of electron carriers and credit was given for references to the electron transfer chain. Candidates also commonly recognised that ATP was formed by the addition ADP and Pi to gain one mark.

Unfortunately very few were able to provide any further detail of the light dependent stage of photosynthesis and some candidates confused it with the Calvin cycle or respiration.

Again, many candidates referred to energy being made / produced / created. This error has been pointed out in previous reports and, therefore, examiners did not credit such statements.

There was evidence of thorough coverage of this area of the specification by a few centres and a number of candidates managed to gain the maximum number of marks available.

(ii) This question was generally well answered and many candidates scored full marks. Examiners were pleased that most candidates were able to identify and describe the process of diffusion with accuracy. A few candidates related the movement of oxygen by osmosis, active transport or facilitated diffusion.

(iii) Very few candidates scored marks on this section of the question. Again, this was largely due to a lack of precision and qualification. The majority of answers referred to lipids in general and often candidates did not qualify the type of lipid (i.e. phospholipid / glycolipid). Descriptions provided were rarely in the correct context of the question, which was to describe the **role** of lipids in cell membranes. Instead, candidates described the general structure of a phospholipid bilayer. No credit was given for this description if it was not linked to the lipids role in the selectivity of the membrane. Some candidates gained credit for referring to a glycolipid's role in cell recognition or as receptors.

(c) This was generally an accessible question for most candidates.

The most commonly credited statements were referring to natural disasters (frequently diseases such as Black Death and HIV), food availability, better healthcare and birth rates. Candidates often lost marks by failing to qualify their answers with respect to the impact caused by the factors identified. Many answers referred to global warming, earthquakes, flooding or tsunamis but statements were often unqualified and few linked this to loss of life or food production / availability.

Examiners were pleased that a large number of candidates were able to recognise the importance of healthcare in reducing the impact of disease and the effect on longevity. Examiners also found that a disturbing number of candidates seemed fixed on the process of IVF and how this is one of the most important destabilising factors of human populations. The mark available for the quality of written communication was frequently awarded but, in a number of cases, answers were barely legible and completely devoid of any punctuation.

Q6 Many candidates scored well on this question and the examiners were especially delighted by the quality of many of the responses seen for the section on factors affecting the speed of transmission along a neurone.

(a) (i) There were many incorrect responses to this question across the range of abilities. In the majority of cases this was because the candidate had misread the question and failed to recognise that they were being asked to state one of the neurones from the table. Perhaps teachers could encourage candidates to read each question more than once in attempt to reduce the number of marks that are needlessly lost this way in future sessions.

(ii) There were some excellent answers to this part of the question with the majority of candidates referring to myelination, Schwann cells and nodes of Ranvier. It was also evident to the examiners that the idea of saltatory conduction was well understood by the majority of candidates.

(b) Most candidates scored at least one mark in this question by correctly identifying that a reflex action / arc was involved. Many also made a correct reference to neuronal pathway to gain credit. Better candidates went on to explain the response in more detail and easily reached the maximum marks available. Where confusion was seen, it was often due to the candidate referring to the brain being involved in the response.

(c) (i) Examiners were pleased that the majority of candidates were able to pick up both of the marks available for this part of the question. Many candidates identified from the stem that the stroke had been caused by a clot and correctly linked this to the area of the brain beyond the clot being deprived of blood and therefore oxygen, for which they earned two marks. The mark for no ATP production was rarely given.

(ii) This part of question was generally not well answered. Many candidates gained one mark for stating that there would be an increase in blood pressure. However, there was some confusion over the effect that a high salt intake would have on the body with many incorrect references to salt making the blood 'thicker' and salt 'sticking' to the artery walls to form a fatty deposit or clot. Examiners were delighted that of the few candidates that understood the relationship between high salt intake and the increased risk of a stroke, most correctly referred to the change in the water potential of the blood and did not confuse this with concentration gradient.

(iii) Many candidates scored full marks in this last section. Examiners did not credit vague references to a high fat diet or lack of exercise if left unqualified and, unfortunately, this is where the majority of marks were lost. Centres should also make it clear to candidates that if a question states the particular number of responses required i.e. **two** in this question, examiners can only credit the first two answers given.

2867 Genetics, Homeostasis and Ageing

General Comments

As is usual for the January session, the number of candidates taking this paper was small.

There were fewer blank spaces on the paper this year, which made it possible to credit positive achievement more effectively.

It was pleasing to see that, even where candidates were struggling, there was evidence of knowledge and understanding that indicated an interest in the subject. The Examiners are hopeful that each candidate was able to demonstrate some positive achievement.

Any science paper will involve dealing with data. Clear understanding of the difference between the words 'describe' and 'explain' continue to be a problem for many candidates, as are the calculations.

60 marks on this paper are available for synoptic questions. These questions include over-reaching skills such as data interpretation, as well as questions using facts, principles and concepts from Modules 2856, 2857 and 2866. Candidates are expected to apply these facts in the context of the content for Module 2867. The topics included in this module are themselves 'over-reaching' and cannot be adequately understood without using material learnt in previous modules. However, candidates frequently fail to spot questions which require synoptic knowledge, or to be adequately familiar with the relevant synoptic topic.

> **Teaching tip**
> Candidates have difficulty in spotting the synoptic links. When a topic in the 2867 specification is first being discussed or during revision, candidates could create mind maps around a central topic. e.g. genetics in 2867 associates with DNA, the genetic code, protein synthesis, meiosis etc. in other modules.

Comments on Individual Questions

Q1 Overall this question was not well answered.

(a) No candidate scored full marks here. The most frequent answer was naming organisms. There were very few references to genetic similarity.

(b) Only one candidate could place the taxonomic groups in order.

> **Teaching tip**
> Candidates often remember this better using a mnemonic: like: King (Kingdom) Philip's (Phylum) Class (Class) Ordered a (Order) Family of (Family) Gentle (Genus) Spaniels (Species). They could try to make one up for themselves.

(c) As with (a), few candidates related this to genetic differences, or could name a different characteristic.

(d) There were no clear explanations of the development of variation within the populations that were separated. Several candidates named physical barriers, although most picked rivers, and related this to adaptation to the environment or groups that could not interbreed as a result.

(e) World wide travel was the most common answer here, but very few candidates related this to interbreeding between populations and the lack of genetic isolation mentioned in (d).

(f) Very few candidates related this to different numbers of chromosomes.

Q2 **(a)** **i)** Most candidates could correctly define 'mutation'.

ii) While most candidates identified that the primary oocyte would go on to form a gamete, very few related this to a mutation occurring in every cell of the offspring.

(b) **(i)** Very few candidates appeared to be aware that sperm only pass on the nucleus to the zygote. Many candidates confused this inheritance with that of the X chromosome alone.

(ii) Very few candidates mentioned that mitochondrial DNA has fewer genes/bases.

(c) No candidate related this to the larger numbers of mitochondria within cells, compared with one nucleus.

> **Teaching tip**
> As candidates have difficulty in spotting the synoptic links, it would be useful to revise organelles and DNA structure when discussing reproduction as well as the genetics.

(d) **i)** The majority of candidates were able to define at least 2 out the 3 terms in this question.

ii) Most candidates referred to the possibility of pre-natal diagnosis, but failed to comment on the risk of the mother passing this condition on to all her children.

(e) Most candidates related this to the lack of ATP/energy, but did not mention that this would be needed for active transport in nerves (neurons), or mentioned the possibility of the mutation affecting the respiratory pathways that result in the formation of ATP.

Q3 The examiners were pleased to note that candidates throughout the ability range were able to score some marks on the QWC question, but a worrying number of candidates used an English style that was very difficult to interpret.

(a) **i)** Most candidates could describe the trends shown by the data.

ii) Most candidates could relate the trend to improved medical care. A few related it to a decrease in birth rate.

(b) The candidates were able to discuss both advantages and disadvantages associated with an ageing population. The most frequent answers were providing childcare and having time to listen, and increased funding needed for healthcare and pensions. Very few candidates discussed the working practices of the ageing population and their voluntary work, or the need to work longer.

(c) **i)** The most frequent answer was a reduction in the activity of the immune system, but very few related infection to poor nutrition, poor gaseous exchange or hypothermia.

ii) Most candidates mentioned the flu vaccination here.

Q4 **(a)** **i)** A worrying number of candidates placed the pituitary gland under the cerebellum.

ii) Most candidates correctly identified temperature regulation and osmoregulation here.

iii) Many candidates confused "to general circulation" with not returning blood to the heart and missed the two capillary beds marked on the diagram.

iv) There were some really good descriptions of the function here, and most candidates could also name a hormone.

v) Few candidates could identify oxytocin and the correct function of FSH, but most candidates could identify ADH and the role of TSH.

(b) **i)** Very few candidates could explain standard deviation.

Teaching tip

Candidates attention should be drawn to the mathematical requirements listed for this specification. The *t*-test is specified for which use of the standard deviation is necessary.

(ii) Most candidates related the increased production of GH to the tumour on the anterior pituitary gland, but did not cover details of uncontrolled mitosis leading to increased numbers of cells producing the hormone.

(iii) This question was not answered well, but some candidates did realise the tumour could become malignant.

iv) The majority of candidates realised that surgery might result in brain damage and suggested radiotherapy or chemotherapy.

Q5 **(a)** This question was a straightforward question and some candidates showed very good knowledge of the structure and function of the kidney. Few candidates gave a clear description of the blood supply and structure of the kidney with respect to the position of the nephron. Most knew that selective reabsorption was the function, but did not describe what molecules/ions were reabsorbed.

Most candidates gained the QWC mark.

(b) **i)** Very few candidates mentioned carcinogens in cigarette smoke and most did not relate the breathing in of these or their absorption into the blood / general circulation, as the way these might get to the kidney.

(ii) Very few candidates used the term metastasis, but most realised that the cells could form tumours in other parts of the body.

(iii) Most candidates realised that blood in the urine, or an unusual colour to the urinem could be the first sign of kidney cancer.

(iv) The most common answer here was an ultrasound scan.

Q6 **(a)** **(i)** and **(ii)** candidates found it difficult to appreciate the significance of the two separate parts of this question, but most candidates came up with the idea of establishing a base line concentration before breakfast.

(b) This part was generally answered well. A large number of candidates picked up on the idea that Mary should reduce her burgers, chips or fizzy drinks, and related this to decreasing refined sugar and increasing complex carbohydrates. Some candidates mentioned a reduction in fat but did not specify saturated fat.

(c) **i)** Very few candidates could identify that the 15 had to be subtracted from the 21.5 for the increase, before the % was calculated. Only 2 candidates seemed to understand what 1 significant figure was.

ii) Most candidates could identify the relationship between diabetes and gross proteinuria, but failed to mention that the two conditions might be linked.

(d) **i)** Many candidates confused the basement membrane with membranes found around cells and organelles. There was some reference to ultrafiltration.

ii) Very few candidates referred to the larger molecules / proteins getting through into the nephron.

Q7 **(a)** **i)** This part was answered well. Most candidates could explain that 'inherited' meant it was genetic and from your parents whilst 'acquired' was something like HIV.

(b) **i)** Very few candidates were able to describe the link between B lymphocytes and plasma cells

ii) Most candidates identified bacteria as the organism.

iii) Many candidates implied that the immunity was passive, inherited from the mother, but very few described this well. A few candidates did refer to the length of time it took for the child's immune system to develop.

(c) **i)** Only 1 candidate could use an appropriate symbol for a sex-linked recessive condition.

ii) This part was poorly answered; very few candidates understood sex-linked inheritance.

iii) Most candidates scored one mark here, by suggesting vaccination.

(d) Most candidates scored some marks on this part, mainly with points about the quality of life of the child, by referring to the child with SCID, or discussing the use of IVF. It was disappointing that as human biologists, all candidates did not score full marks.

Grade Thresholds

Advanced GCE (Subject) (Aggregation Code(s))
January 2008 Examination Series

Unit Threshold Marks

Unit		Maximum Mark	a	b	c	d	e	u
2856	Raw	60	45	39	33	27	22	0
	UMS	90	72	63	54	45	36	0
2857	Raw	60	50	44	38	32	26	0
	UMS	90	72	63	54	45	36	0
2858/B	Raw	120	95	83	72	61	50	0
	UMS	120	96	84	72	60	48	0
2866	Raw	90	65	57	49	41	33	0
	UMS	90	72	63	54	45	36	0
2867	Raw	120	87	77	67	57	47	0
	UMS	120	96	84	72	60	48	0

Specification Aggregation Results

Overall threshold marks in UMS (ie after conversion of raw marks to uniform marks)

	Maximum Mark	A	B	C	D	E	U
3886	300	240	210	180	150	120	0
7886	600	480	420	360	300	240	0

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

	A	B	C	D	E	U	Total Number of Candidates
3886	1.6	11.1	23.8	57.1	90.5	100.0	65
7886	0.0	0.0	28.6	42.9	100.0	100.0	7

72 candidates aggregated this series

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

Statistics are correct at the time of publication.

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