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Edexcel GCE

Biology (8040/9040)

Biology (Human) (8042/9042)

This Examiners' Report relates to Mark Scheme Publication code: UA016171

January 2005

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Examiners' Report

Edexcel GCE
Biology (8040/9040)
Biology (Human) (8042/9042)

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Contents

6101 Unit 1 Examiner Report

Maximum mark 60

Mean mark 32.4

Standard deviation 10.8

General comments
Questions 1,2 and 4 were mark yielding. Question 6, which required candidates to read and interpret the information provided, proved the most demanding.

Question 1
There was a wide range of marks on this question but a significant number of candidates were able to gain full marks. Some answers did not include both glycerol and fatty acids. In general the bonds were better known than the names of the biological molecules. Most confusion concerned the name of the polysaccharide.

Question 2
Many candidates scored full marks on this question demonstrating a good knowledge of the process of mitosis. Weaker candidates confused the terms chromatid, centrosome, centriole and centromere. There was some confusion about which membrane was breaking down, with a number of candidates stating that it was the cell membrane or even the cell.

Question 3
In part (a) (ii) some candidates focused on the disulphide bonds rather than the presence of more than one chain. In part (b)(ii) most answers referred to the function of the insulin determining its structure rather than describing the bonding. There was little reference to R groups.

Question 4
When naming structure A in the bacterial cell, in part (a) (i), many candidates seemed unaware of the difference between the singular 'flagellum' and plural 'flagella'. Vague answers such as 'genetic material' were seen for structure B instead of DNA and incorrect answers such as plasmid or chromatin were relatively common.
In part (b) most candidates correctly measured the length of the bacterial cell from X-Y and a majority then divided this by 6000. The problem seemed to be in converting units to μm with many errors arising from the misuse of standard form notation

Question 5
This was well answered. It is pleasing to note that examiners were frequently able to award full marks for this question. Good descriptions of both the structure and functions of centrioles were seen but it was often the case that although the structure was described clearly the function was not so well understood. Many gave the impression that centrioles and spindle fibres are the same structures.

Question 6

In part (a) many only described movement of the membrane with far fewer realising that it was the phospholipids that move. Most mentioned the presence of proteins.

In part (c) many could do no more than describe an increase in red coloration although some did comment on the concentration of bile salts after which there was no further increase in the intensity of the red colour.

Some of the answers to part (d) showed a complete misunderstanding. Some candidates referred to the bile salts having active sites. Another common approach was to ignore completely the effect of bile salts on the membrane and instead focus on bile salts lowering the water potential of the solution around the beetroot cells.

Question 7

In part (b) there were a number of excellent accounts given of transcription. These correctly sequenced the events and correctly identified the role of RNA polymerase. However there was still the usual confusion of transcription with DNA replication or even a hybrid description of both processes.

A pleasing number of candidates correctly referred to RNA nucleotides lining up against their complementary bases, however many also inaccurately referred to 'bases lining up' or used the terms 'matching' or 'corresponding' in place of complementary.

Question 8

In part (a) a significant number of candidates clearly understood the roles of pectinase in clarification of fruit juices, wines or vinegar. Some however, thought it could be used as a meat tenderizer or to reduce lactose in milk.

In parts (b)(ii) and (iii) candidates were asked to *describe* and *explain* the shape of the graphs. A number of candidates scored low marks on these parts as they failed to give any explanation. Candidates should make clear that it is the change of shape of the active site that causes the enzyme to denature.

The majority of candidates correctly sketched and labelled a curve between lines A and B to gain both marks in part (c)(i) but in (ii) too many candidates just simply stated that an increase in inhibitor caused a decrease in juice production. Only a few discussed the binding of the inhibitor to the enzyme's active site, thus competing with the substrate and slowing the reaction without stopping it completely.

6102 Unit 2B Examiner Report

Maximum mark 60

Mean mark 29.6

Standard deviation 10.1

General comments
In general, this was considered to be an accessible Paper and candidates coped well, particularly with Questions 3 parts (a) and (b), 4, 7 and 8. Answers to the other questions were more variable and Questions 3 part (c) and 5 were generally quite low scoring. In many cases, candidates failed to gain marks as a result of not addressing the question carefully and writing rather general accounts, which may not have included relevant information. As an example, this was true of Question 4 part (c) where many answers included irrelevant details of digestion, rather than describing the structure of the ileum in relation to absorption.

Question 1
Answers to this question were rather variable, but many candidates gained at least two marks, usually for references to phagocytosis. The neutrophil and monocyte were better known than the lymphocyte, which was frequently identified incorrectly. Candidates were, however, able to gain marks for the functions of the cells illustrated, if their identifications were incorrect. Some of the descriptions of phagocytosis were rather vague; Examiners expected references to phagocytosis of bacteria, for example, rather than 'foreign bodies'.

Question 2
There were many good answers to this question, where candidates were able to describe what is happening to the chromosomes in each stage. However, some of the answers were not accurately expressed, particularly in part (a)(iii), where it was not clear whether candidates were describing separation of pairs of chromosomes of separation of each chromosome into chromatids. This suggested confusion between anaphase I and anaphase II.

Question 3
Parts (a) and (b) were generally answered well and some detailed accounts were seen in part (b). Some of the attempts at part (b) were rather general accounts of the cardiac cycle, with only passing references to the left ventricle and parts B and C. This is an example of where candidates failed to gain marks by not specifically answering the question. Also, some of the accounts were confused and inaccurate, or poorly worded. As an example, some candidates referred to the thick wall of the left ventricle being able to 'withstand' high pressure, rather than relating this to the relatively high pressure generated when the left ventricle contracts. Part (c) was generally not well answered as many candidates failed to appreciate that the data related to increases in oxygen used by the uterus and heart. Most of the answers to part (i) related to the oxygen demand of the fetus, but some candidates appreciated that the heart is working harder during pregnancy to supply blood to the placenta, for example, and therefore gained marks in part (ii).

Question 4
In the past, questions relating to digestion have frequently scored rather poorly. It was gratifying, therefore, that many candidates coped well with this question and obtained high marks. In part (a), the majority of candidates correctly identified the pancreas, although various other abdominal organs were seen. Some of the answers to part (b)(i) referred to carbohydrate digestion in general, without giving specific details of the action of amylase. In part (b)(ii) the majority of candidates referred correctly to either neutralisation of acid chyme, or to providing a suitable pH for enzyme activity.

Many candidates gained full marks in part (c) for writing detailed accounts of the structure of the ileum in relation to absorption of the products of digestion. There were, however, also some very general accounts of the function of the ileum with irrelevant details of digestion and it was clear that, in some cases, candidates were unsure of the difference between digestion and absorption.

Question 5

In general, candidates gained marks only for the first part of this question. The majority of answers referred to the functions of alveoli in general, rather than concentrating on the thin exchange surface and maintenance of a concentration gradient. As an example, some answers stated that capillaries are present around alveoli, but did not extend this to explain how blood movement helps to maintain a concentration gradient. Answers to the second part of this question suggested, in a number of cases, that candidates were unfamiliar with protozoa and referred to, for example, the presence of a thin cell wall.

Question 6

This question was much better answered than Question 5 and the majority of candidates gained good marks. Many candidates were able to apply their knowledge of leaf structure to part (a) and gained full marks. In part (b), there were many sensible suggestions relating to buoyancy and to diffusion of gases. In part (c), candidates gained marks for referring either to gas exchange in relation to the upper epidermis, or to stomata letting in water if they were on the lower epidermis. Relatively few candidates gained both marks here. Overall, the standard of answers was pleasing and indicated that many candidates were familiar with the adaptations of hydrophytes to their environment.

Question 7

Many candidates gained full marks for this question, by giving detailed descriptions of the data in part (a) and accurate explanations in part (b). In part (a), many candidates recognised that, in potassium chloride solution, the greatest change in the mean width of stomatal pores occurred from 0 to 3 hours and that thereafter the width fluctuated. The majority of candidates also correctly observed that there was no change in the control. Some candidates quoted figures directly from the table to support their answers, but the Examiners always expect a simple manipulation of the data, such as stating that the width increased by 7.6 μm overall. There were some very detailed explanations in part (b), which readily gained full marks. However, some of the answers referred to potassium ions entering the stomata, rather than entering the guard cells. In general, a large number of answers indicated a thorough knowledge and understanding of stomatal opening in relation to changes in ion concentration and turgor of the guard cells.

Question 8

Part (b) of this question was generally answered more successfully than part (a), but overall this was a high-scoring question. In part (a)(i), one common error was reading the values inaccurately from the graph. Indeed, some candidates drew freehand lines to the curves, which almost inevitably resulted in incorrect values being quoted. In part (a)(ii), many candidates gained credit for references to increased dissociation of oxygen from haemoglobin and for indicating that oxygen is required for respiration of the tissue. Relatively few candidates also referred to the decrease in affinity of haemoglobin for oxygen at a high partial pressure of carbon dioxide; some suggested incorrectly that the tissue has a higher affinity for oxygen. In part (b), many candidates gained credit for references to the transport of carbon dioxide in the form of hydrogencarbonate ions, or in simple solution. Some candidates misinterpreted this part and described the pathway taken by carbon dioxide from body tissue to the lungs, rather than how carbon dioxide is transported. However, it was pleasing to read many detailed accounts, which showed a sound knowledge and understanding of the transport of carbon dioxide.

6112 Unit 2H Examiner Report

Maximum mark 60

Mean mark 28.5

Standard deviation 10.1

General comments
Questions 1, 2, 3, 4 and 8 on this Paper were common with 6102 and, in general, the performance of candidates on these questions was comparable. Questions 3 parts (a) and (b), 4, and 8 part (b) were answered well. There were also some good answers to Question 6, although the answers were rather variable. Questions 3 part (c), 5 and 7 were answered less successfully than the others.

Question 1 – Question 4
Common with 6102, Unit 2B.

Question 5
Part of this question (alveoli) was common with 6102 and the standard of answers was comparable with that of 6102, although candidates for 6112 might have been expected to be more familiar with squamous epithelium. Answers to this part tended to be general descriptions of the structure and function of alveoli, with few references to the thin exchange surface and maintenance of a concentration gradient, in relation to increasing the rate of diffusion. Descriptions of the placenta also tended to be rather general, without specific references to the maintenance of a concentration gradient. Some candidates, however, incidentally gained marks for references to chorionic villi or to fetal haemoglobin.

Question 6
A broad mark scheme gave candidates credit for a wide range of physiological adaptations to high altitude, or to cold conditions, and some very good answers were seen which readily gained full marks. The majority of correct answers referred to respiratory or circulatory changes. There were, however, a number of incorrect and inappropriate suggestions, usually relating to behavioural responses. Some candidates clearly did not appreciate that the adaptations are related to the environmental conditions in high mountains, such as a low partial pressure of oxygen.

Question 7
The majority of candidates correctly answered part (a), giving correct comparisons of the protein, fat and carbohydrate content of human and dried milk. Part (b), however, was less well answered as many candidates gave extended comparisons of the nutritional content, but without referring to the nutritional advantages and disadvantages. Many of the answers were, therefore, incomplete. Candidates found part (c) of this question difficult and, although there were some good answers, marks were generally low. Relatively few of the answers related to the diagram and did not always put the series of events into a suitable sequence.

Question 8
Common with 6102

6103/01 Unit 3 T1 Individual Investigation Examiner Report

Maximum mark 32

Mean mark 19.9

Standard deviation 5.0

General comments

Compared with January 2004, candidates undertook a greater variety of investigations, in which Planning skills were more clearly demonstrated. Centres provided candidates with greater opportunities to develop individual approaches. Nevertheless there were still too many enzyme experiments that were undertaken in such a way as to be almost indistinguishable from standard GCSE exercises. Candidates are unlikely to derive high scores from such studies, especially in the Analysing and Evaluating sections. Nevertheless this January's candidates showed better skills in these sections than previously, but they remained the weakest aspects overall. Graphs were generally well drawn, were selective and often carried plotted points with error bars. In Evaluating, it was rare to find a candidate's script that contained no reference to variability. These were marked improvements.

January examinations generally present moderators with particular problems and this year was no exception. These are usually of the administrative kind. Many centres submitted the work of single candidates, which is not a problem in itself, but often these were old investigations that contained new work. It was not made clear by centres in what ways the original submission had been altered. The rules for re-submission were clearly outlined in the January 2004 Report and are repeated once more in the Administrative Section of the current one. Re-submissions require considerable re-working, which generally means the collection of additional data from which to change Analysing and Evaluative comments.

Sometimes investigations were received from candidates whose option was to transfer marks from the summer. The OPTEMS forms did not acknowledge this, so that work was re-moderated unnecessarily. In addition, Record Cards were frequently incomplete, being without either a candidate's or teacher's signature and, occasionally, without both. Unfortunately some 10% of centres that were sent reminders by moderators about these omissions failed to respond.
It is particularly disappointing that these administrative weaknesses are increasing, since these were pointed out last January. Further clarification on all these issues is to be found in the Administrative Section of this Report.

In this January's investigations, the following were the most common areas in which higher marks could have been achieved, listed by skill area.

Planning

- Further development of originality in hypotheses, so that investigations are not about 'proof' of well known facts.
- Properly focused biological knowledge to support each hypothesis. Many plans tended to describe everything about enzymes, but contained very little about the likely effect of a particular variable on a specific enzyme.
- More complete detail about the need for the control of variables and the methods adopted either to control them, or to limit their effects. The most effective way of achieving this is by devoting a separate section to variables and their control.

Implementing

- Annotation that explains the reasons for awarding I(a) and (b) marks.

Analysing

- More specific explanations of experimental results linked to trends and patterns. Sometimes these were entirely omitted. Too often biological comments are merely repeats of the descriptions made in Planning, which have little relevance here unless they are closely linked to the experimental results. Without this detail, the Analysing section cannot score more than 5.

Evaluating

Many candidates included error bars on plotted points and even some weaker candidates did so, but there was only rarely an understanding as to why they were included. It is a weakness perhaps that derives from an experimental design that has 'proof' as its central theme. When an investigation produces an unlikely result (such as an unexpected temperature, or pH, optimum for an enzyme catalysed reaction), candidates become unsettled. They generally respond by suggesting that 'their investigations were poor', instead of looking at the error bars, which might provide a starting point for evaluative comment. Often interesting plans, which contain unusual, though scientifically supportable hypotheses, generate high scores in this section. Part (a) therefore continues to be the main weakness in Evaluating an investigation.

- Higher marks can only be achieved by the use of variability in the data in determining the reliability of experimental conclusions. It is essential that candidates make reference to selective reference points in order to make their judgements. Non-specific comments rarely score more than 4 marks.

Administration

In most of the recent Reports, Principal Moderators have requested that investigations are individually secured by treasury tags and not enclosed in pocket files. Unfortunately about half of this January's centres continued to send us work in plastic pockets. Extracting the work from them and then re-securing the separate sheets is very time consuming.

Finally it is important to remind centres once again that

- Candidates who wish to transfer a coursework mark from a previous attempt must be entered for 6103 Option T on the main entry form. Folders of work should not be sent to the moderator.
- An investigation which is re-submitted from a previous examination must contain substantial new material. The centre **MUST INDICATE ON THE SCRIPT WHICH ASPECTS HAVE BEEN RE-WORKED**. Moderators are looking for **new data** that will enable candidates to renew their Analysing and Evaluating sections. **THE RE-SUBMISSION OF WORK FROM A PREVIOUS EXAMINATION WITHOUT SIGNIFICANT ADDITIONAL DATA IS NOT ACCEPTABLE.**
- Record sheets should carry a title of the investigation and must contain two signatures, that of the teacher supervising the investigation and the candidate. **The up-to-date record sheet can be found in the most recent version of the subject specification and is available to download from the GCE Biology section on the Edexcel website.** (Please note that the record sheet contained in the original Coursework Guide, which is still available on the Edexcel website, is NOT acceptable.)
- Centre notes and marks should be written on the scripts themselves. Moderators would like to see this information adjacent to the candidate's written work, so that it is apparent why the centre awarded marks for specific skill areas.

6103/03 Unit 3 Paper 03 Examiner Report

Maximum mark 38

Mean mark 18.7

Standard deviation 5.9

General comments

The examiners were pleased to see good responses in all parts of the questions. On questions, where several marks could be gained by applying the knowledge expected by the specification, many excellent answers were seen. In questions where candidates needed to make sound use of the information and data presented, responses were more variable. On this paper it is essential that candidates are able to express themselves clearly. The examiners have noted that they were often unable to give full credit to answers that were ambiguous or contradictory. There was no evidence of candidates being unable to complete the paper in the time allocation.

Question 1

In part (a), most candidates made some reference to the synthesis of organic material using inorganic raw materials. Photosynthesis was quoted quite frequently as an example.

Part (b) was fairly high-scoring. However, many candidates did not appreciate that productivity is a rate. A large number of candidates referred to the production of energy. Few candidates were able to give satisfactory references to gross or net productivity.

Answers to part (c) were extremely varied. There were some very good explanations. However, many candidates were unable to go much further than giving an answer that used the terms in the question e.g. it is managing a forest in a manner that sustains it. Other candidates gave answers that implied that the forest was replaced after it had been removed completely. Coppicing was often quoted as an acceptable example.

Question 2

In part (a)(i), some candidates were able to make sound and concise comparisons. Many answers could not gain credit as they gave little more than a list of the given data. Some candidates seemed to think that the different mesh sizes meant that the bags were buried at different depths. In part (a)(ii), although many candidates realised that the difference in mesh size might make a difference to the organisms able to reach the leaves, many candidates referred to bacteria even though the smallest mesh size is 0.05 mm.

In part (b), most candidates were able to state the relationship correctly. Some candidates assumed that the nitrogen content increased as the leaves decomposed. Relatively few candidates were able to score the second mark.

The answers to part (c) were very disappointing. Many candidates gave answers that included references to different rates of photosynthesis and the need to either retain or lose leaves. There were some excellent descriptions of the effect of the different environmental conditions and the structure of the leaves upon the relative rates of decomposition.

In part (d), most candidates gave good descriptions of nitrification. Some candidates were confused as to the source of the ammonium ions, giving answers that included nitrogen fixation.

Question 3

Part (a) was answered well by most candidates and full credit was often given. Some candidates only referred to carbon dioxide in their answers or did not name the relevant gases.

Most candidates could name the correct organisms in part (b) and the reasons were usually acceptable. Some candidates confused acidity and pH e.g. they can survive when the acidity goes above pH 5.

In part (c), the question required comparison of the changes. Many candidates gave separate descriptions of the catches in the two types of river condition. A large number of candidates did not appreciate that all of the data is comparative with the original catches and is not actual numbers of fish. Many candidates stated that the catch in non-acidified rivers was the same in 1985 as it was in 1935. Where candidates tried to use figures from the graph, it was quite common to find that they had misread the graph scale e.g. 114% was often quoted as 112% and 2% was often given as 0%.

For part (d), some good answers were seen with detailed explanations of the effect of aluminium ions upon gills and the effects of low pH upon fish eggs. Some candidates were able to gain marks by reference to possible food chain effects. However, many candidates gave the eutrophication story and assumed that the fish die as a result of oxygen depletion.

In part (e)(i) very few candidates were able to manipulate the correct data and obtain the correct answer. The most common errors were (125 / 5) x 100 = 2500% and (120 / 125) x 100 = 96%.
For part (e)(ii), most candidates gave acceptable answers. Only a small number of candidates referred to rivers only or stated that the lime would be washed away in a river but not in a lake without an explanation.

6104 Unit 4 Core Examiner Report

	Option A	Option B	Option C
Maximum mark.....	40	40	40
Mean mark.....	17.6	17.3	18.5
Standard deviation	6.8	7.1	6.8

Question 1
Most candidates scored between two and four marks on this question. Frequent mistakes included confusing the cerebrum with the cerebellum and the omission of the word 'control' when stating the functions of the medulla and the hypothalamus.

Question 2
Candidates found this question challenging because they did not identify this as a question about the electron transport chain and the role of oxygen as a terminal electron acceptor. A high proportion of candidates thought that yeast produced oxygen, which was why the oxygen levels never fell to zero.

Question 3
In part (a) many gave depolarising and repolarising in the reversed order. Understanding of how the membrane potential changed (part (b)) was shown by many candidates but marks were lost through poor expression with many candidates stating that sodium ions entered the membrane or just simply stating ions. Most gained 2 marks with only higher scoring candidates telling us that as depolarisation progressed more gates opened and then closed after 2 ms. The calculation was attempted by the majority of candidates but very few did it correctly; candidates could neither find the duration of the action potential nor knew to divide the answer into a thousand. In the last part of this question the marking points 'hyperpolarisation' and 'refractory period' were seen often. However many lost the hyperpolarisation marks by incorrectly describing the movement of potassium *into* the axon rather than out of it.

Question 4
This was well answered, with even the weaker candidates scoring marks. In part (c) marks were lost by those candidates who suggested in their answers that the gradients of the lines represented the rates of filtration / reabsorption, stating that the rates were increasing at the same rate. As seen in previous years, candidates do not read values from the graph accurately or state the units, costing marks. In part (e) many answers gave an account of ADH causing more water to enter the tubules to dilute the glucose.

Question 5
The majority of candidates scored between 4 and 7 marks for this question with very few getting full marks (or zero), which is quite unusual. The 4 marks which were most commonly scored were for stating that rhodopsin is found in rod cells and iodopsin in cone cells and for describing the bleaching of rhodopsin. The majority of candidates would have scored better if their answer had been in the context of the pigments, as asked for in the question and not in the context of rods and cones.
It was very obvious that candidates had practiced questions from past papers as there were some wonderful accounts on the ratios of rods and cones to bipolar cells and the significance of this.

6104/01 Unit 4 Option A Examiner Report

	Option only	Core + Option
Maximum mark	30	70
Mean mark	14.1	31.7
Standard deviation	5.2	11.2

Question 6
In both parts of this question it was poorly worded answers that cost candidates marks. In part (a) the virus or RNA became incorporated into the host cell genome, the virus required the trigger to enter the replication cycle and many wrote about a delay in the onset of symptoms and not in the formation of virus particles. In part (b) many suggested that the bacteria themselves were endotoxins / exotoxins and there was the usual problem of candidates not writing *comparable* facts about each of the toxins.

Question 7
Some of this question tested parts of the specification that have not been tested previously and on the whole candidates dealt well with this. The commonest mistake in part (a) was to write about the 'disease' entering the body rather than stating that it is the microorganism that actually penetrates the cells or tissues. Part (b) was very high scoring although there were a number of candidates who could not name the chemicals used. All candidates attempted (c) (i), usually picking up at least one mark. A common mistake was to explain that damage to the alveoli caused the bleeding. It was clear from the answers given to part (ii) that candidates know several reasons for the spread of resistance but few took this further to explain that the resistant bacteria reproduce passing resistance genes on.

Question 8
This was a very high scoring question. Candidates clearly know about anaerobic respiration and full marks were frequently awarded to answers to part (a). Part (b) was also handled well.

Question 9
Most candidates know the precautions that should be taken in dilution plating but some lost marks by not actually answering the question, omitting to state the effect on the number of colonies. The calculation was dealt with well, with virtually all candidates realising that an average of available counts should be used. Part (c) was clearly the most challenging question on the option section. Very few candidates appreciated that the activities of the bacteria were causing the decrease in pH and instead were explaining that the fall in pH was causing the cell number to increase. Very few candidates realised that part (ii) was asking about the early changes that occur to milk in yoghurt production and could not give an explanation. Many stated that the dead bacteria caused the unpleasant smell.

6104/02 Unit 4 Option B Examiner Report

	Option only	Core + Option
Maximum mark	30	70
Mean mark	13.6	30.9
Standard deviation	5.3	11.4

General comments
A wide range of marks was awarded to candidates on all of the questions on this paper. Questions relating to practical work were the most challenging to candidates. Candidates should be reminded that the practical work signposted in the specification may be tested in the Unit Tests.

Question 6
It was pleasing to see that the majority of candidates could state the correct relationship between mass and height in (a) (i) and could also clearly state the meaning of obesity in part (ii). However, in part (b) there were a number of answers that referred vaguely to fatty deposits in the body and made no reference at all to the blood system. Those that did relate their answers to blood vessels often did not focus on the coronary system. There were many imprecise descriptions of blockages in blood vessels.

Question 7
Answers to part (a) that referred to killing pathogenic bacteria left examiners with the impression that candidates were confusing sterilisation with pasteurization. Disappointingly few gave clear statements that indicated that all bacteria were killed. Part (b) was answered very poorly. Often no attempt was made to describe this basic practical technique, suggesting that some centres had not provided the opportunity for their candidates to perform a turbidity test. Many other candidates confused the turbidity test with resazurin or methylene blue tests that they may have performed on milk during their course.

Question 8
In part (a) examiners were often able to award all 3 marks. In part (b) however, many answers about respiration lacked references to *aerobic* respiration being decreased. A significant number of candidates were able to gain a mark for stating that ripening would be delayed or that ethene production would be reduced.

Question 9
Readings from the graph in part (a) were sometimes inaccurate. It was noticeable that many candidates did not read the question carefully and attempted to calculate the percentage difference between the two calorific values. The full range of marks was awarded in part (b) but in part (c) there were few candidates that understood the need for dry mass. When describing the reasons for a higher BMR in males than females in (d)(ii) it was worrying that a number of sexist comments were seen. However, a larger number of candidates gave good answers relating to the metabolic activity of muscle tissue.

6104/03 Unit 4 Option C Examiner Report

	Option only	Core + Option
Maximum mark	30	70
Mean mark	13.3	31.8
Standard deviation	4.9	10.8

General comments
Many candidates now seem to be answering the questions in the most direct way without overcomplicating their answers. The majority were able to attempt all questions. However, although pneumoconiosis and the procedure for measuring skin fold thickness are stated clearly on the specifications, very few were able to answer the questions on these topics well.
There continues to be considerable use on non-scientific language e.g. carbohydrates 'converted to' or 'made up of' glucose and passive immunity being 'passed via the placenta'.

Question 6
There was evidence that candidates are getting better at comparisons, most gained some marks in this question.
The answers for part (a) were often detailed and indicated that candidates are very familiar with immunity. Marks were lost due to a lack of comparative statements and a lack of clarity in describing the source of the antibodies in passive immunity. It was clear that candidates were aware of the need to be exposed to antigens in order to trigger an immune response.
For part (b) it was apparent that candidates had learnt old mark schemes. This question asked about causes only. Few appreciated that this disease develops due to exposure over a long period of time and the inflammatory nature of the disease.

Question 7
In part (a) the majority of candidates were aware of carbohydrates as an energy source but did not answer in comparative terms. Candidates seemed to be reading too much into the question and explained how energy is supplied by glycogen.
Candidates were familiar with the role of creatine phosphate in part (b).
In part (c), most gained 1 mark for a method of obtaining ATP, although few were able to state clear reasons for their answers. The phrase 'alactic anaerobic system' was seen often. This did not gain marks as it confuses two different systems. Candidates did not appreciate that the alactic system is independent of oxygen.

Question 8
Many candidates had no idea how the procedure in part (a) is carried out even though it is clearly stated as a core practical in the specification. However, some were able to gain marks by naming the apparatus and taking measurements from different places on the body. There was a surprising variety of incorrect names suggested for callipers such as pincers, pliers and tweezers. Candidates also chose inappropriate parts of the body at which to take the measurements, e.g. the stomach, which is an internal organ and not a site at which skin fold measurements can be taken. The quality of expression made it difficult to award many marks in this section.

In part (b) there were many references to 'excess fat putting strain on the heart'. This does not show understanding of CHD or the anatomy of the cardiovascular system. Candidates also failed to refer to increased levels of cholesterol etc in the blood. 'Blood vessels' was used instead of arteries and some candidates referred to veins and capillaries as sites where atheroma might develop.
Part (c) was answered well by the majority of candidates.

Question 9
Very few were able to calculate the percentage increase in part (a); many were unable to calculate the reduction correctly.
Many candidates had not understood that part (b) referred to the blood flow to the cardiac muscle itself and not the skeletal muscle. As a result marks were lost as answers did not demonstrate that the candidates knew the cardiac muscle required more oxygen to increase its rate of respiration.
In part (c) many candidates had not interpreted the question correctly. The question asked about changes from low to high intensity exercise and many candidates wasted time and space explaining about changes in blood flow from rest or compared the blood flow between cardiac muscle and skin.
Part (d) was slightly better answered, for example most realised that increased flow to the skin was concerned with heat loss, although very few indicated that muscles would generate extra heat as the level of exercise increased. Many also gained credit for showing an appreciation for the need to redirect blood to muscles during intense levels of exercise.

UNIT GRADE BOUNDARIES AND UNIFORM MARKS

The raw mark obtained in each module is converted into a standardised mark on a uniform mark scale, and the uniform marks are then aggregated into a total for the subject. Details of the method of aggregation are given in Appendix A.

For AS examinations, the three unit tests each have a weighting of 33.3% with a maximum of 100 uniform marks.

For the A level, the six unit tests each have a weighting of 16.7% with a maximum of 100 uniform marks.

The table below shows the boundaries at which raw marks were converted into uniform marks in this examination. The A and E grade boundaries are determined by inspection of the quality of the candidates' work. The other grade boundaries are determined by dividing the range of marks between A and E. Marks within each grade are scaled appropriately within the equivalent range of uniform marks.

In Unit 3, the A and E boundaries are determined separately on the two components T1 and Paper 03 (or W1 and Paper 03 for International). These marks are then added together to find the A and E boundaries for Unit 3 as a whole, and the other grade boundaries for the Unit are then found as described above. Boundaries for the B, C and D grades for each component can be calculated in the same way, but please note that these are **not** simply added together to obtain the B, C and D boundaries for the unit as a whole.

Unit grade boundaries

Unit	Maximum mark	Grade				
		A	B	C	D	E
	Uniform marks					
	100	80	70	60	50	40
	Raw marks					
6101 Unit 1	60	42	37	32	28	24
6102 Unit 2B	60	39	35	31	27	24
6112 Unit 2H	60	40	36	32	28	24
6103 Unit 3	70	50	44	38	32	27
Paper 01 T1	*32*	*26*	*22*	*18*	*15*	*12*
Paper 03	*38*	*24*	*21*	*19*	*17*	*15*
6104 Unit 4 Option A	70	45	40	35	30	26
6104 Unit 4 Option B	70	45	40	35	30	26
6104 Unit 4 Option C	70	44	39	34	30	26

PROVISIONAL STATISTICS

The provisional percentages of candidates obtaining at least the indicated grade are given below.

Unit	Number sat	Cumulative percentage of candidates				
		A	B	C	D	E
6101 Unit 1	8 842	22.7	39.6	56.4	68.0	78.3
6102 Unit 2B	2 760	19.6	33.2	47.7	62.4	72.1
6112 Unit 2H	427	14.3	26.2	37.5	52.9	66.7
6103 Unit 3	697	15.6	33.4	58.8	78.5	88.8
6104 Unit 4 Option A	1 780	13.0	25.9	41.5	57.8	70.1
6104 Unit 4 Option B	757	12.3	24.9	38.9	53.6	66.1
6104 Unit 4 Option C	1 993	14.2	28.2	46.2	59.8	71.1

AS cash in	Entry	A	B	C	D	E
8040	409	15.2	31.1	50.9	72.4	89.7
8042	68	8.8	22.1	36.8	55.9	83.8

A level cash in	Entry	A	B	C	D	E
9040	59	11.9	40.7	64.4	86.4	94.9
9042	15	10.0	20.0	40.0	40.0	80.0

APPENDIX A
The Uniform Mark System for AS and A level Unit Schemes

The result for each unit will be issued as a standardised mark on a uniform mark scale. AS subjects have a total of 300 uniform marks and A level subjects have a total of 600 uniform marks.

Tables 1 and 2 show the numbers of uniform marks required to gain each subject grade in AS and A level examinations. They also indicate the number of uniform marks in units with various weightings that will aggregate into the appropriate subject grade. These provide a guide to the level of performance in each unit.

The uniform marks shown for each unit do not necessarily represent the actual mark range used for marking the module. Grade boundaries for modules are set at Awarding meetings on the basis of candidate performance on the actual mark range used. These boundaries are then converted to the uniform marks shown in the tables, with intermediate values calculated accordingly.

Table 1 – Advanced Subsidiary Subjects

Subject		Unit Weighting					
Grade	**UM**	**20%**	**30%**	**$33\frac{1}{3}$%**	**40%**	**50%**	**60%**
Max mark	**300**	60	90	**100**	120	150	180
A	**240**	48	72	**80**	96	120	144
B	**210**	42	63	**70**	84	105	126
C	**180**	36	54	**60**	72	90	108
D	**150**	30	45	**50**	60	75	90
E	**120**	24	36	**40**	48	60	72

For example, a candidate for AS Biology or Biology (Human) must take three modules, all weighted at 33.3% of the subject.

	Uniform mark obtained	**Approximate level of performance**
Unit 1	65	C
Unit 2	73	B
Unit 3	80	A
Subject Total	**218**	**Subject Grade = B**

Table 2 – Advanced Level Subjects

Subject		Unit Weighting				
Grade	**UM**	**15%**	**16^2_3%**	**20%**	**25%**	**30%**
Max mark	**600**	90	**100**	120	150	180
A	**480**	72	**80**	96	120	144
B	**420**	63	**70**	84	105	126
C	**360**	54	**60**	72	90	108
D	**300**	45	**50**	60	75	90
E	**240**	36	**40**	48	60	72

For example, a candidate for A level Biology or Biology (Human) must take six units, all weighted at 16.7%. The candidate in this example has four units in the bank.

	Uniform Mark Obtained	**Approximate level of performance**
Unit1	59	D
Unit 2	53	D
Unit 3	69	C
Unit 4	82	A
Unit 5	*	
Unit 6	*	
	Partial Total in Bank = 263	

The candidate already has 263 uniform marks in the bank. If a Grade C is required in the subject, the candidate must obtain at least 97 marks from the remaining two units (e.g. 45 +52) in order to gain the minimum uniform mark of 360 for a Grade C (263 + 97 = 360).

A subject grade of B would require at least 157 extra uniform marks (e.g. 80+77) and would require a performance somewhat better than the average achieved so far.

There is no rule requiring candidates to take units amounting to 30% of the examination at the time of cashing in, nor do candidates have to take all papers with synoptic assessment at the same time at their first cash in.

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