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General Certificate of Secondary Education

Additional Science 4463 / Biology 4411

BLY2H Unit Biology 2

Report on the Examination

2011 examination – June series

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Additional Science / Biology
Higher Tier BLY2H

General

Over 1500 candidates achieved fewer than 10 marks on this paper. This is of considerable concern to examiners who reported that many of these lacked the in-depth knowledge and understanding to tackle the Higher Tier paper. Many of these candidates showed, in the way they attempted to answer questions that they often did not understand what was being asked of them and it was clear that these candidates would have been better served by being entered for the Foundation Tier paper.
However, although the majority of candidates showed good application, a number of misconceptions were a common thread across a wide range of candidates and these often detracted from the overall impression of candidates' work. All of these misconceptions have been commented on in the reports from previous examinations; however a further reference to the three most common amongst them in this introduction may reach a wider audience. The number of candidates who refer to enzymes as 'being killed' by high temperatures, rather than being denatured or destroyed, has on the whole gone down in recent years, although there remains a significant number of candidates who disqualify themselves from possible marks by using this term. Secondly, the number of candidates who refer to respiration as either 'producing energy' or 'using energy', rather than 'releasing energy', remains high. Finally, and most common of all, is the idea that blood vessels move up or down within the skin, rather than simply dilating (or constricting). The avoidance of these three errors could well have provided many candidates with an additional three or four marks. These, and other, less common misconceptions will be referred to within the reports on individual questions.
A further and common cause for candidates failing to gain marks is their misunderstanding of the command words at the start of each question. Words such as 'explain' and 'describe' are often transposed in candidates' minds, so they answer a different question to the one that was asked. However excellent those answers may be in different circumstances, giving good answers to the wrong question unfortunately gains no marks.
Candidates' use of language often lets them down too. When comparisons are required, these are often not given; so although 'more photosynthesis' may gain a mark 'photosynthesis' alone would not.
Hence it appears that candidates are often let down by poor examination technique as much as by their lack of knowledge, which is occasionally well above expectation at this level.
Where necessary candidates should be encouraged to continue their answers beyond the space provided. It is vital however, that when they do they should identify where this continuation is. A brief note such as 'on paper' or 'continued below' would certainly avoid examiners having to search through white space on the same or adjacent pages. Furthermore if what is on the lines finishes at the end of a sentence and a new one is begun elsewhere on the page, there is a high chance that this continuation will not be seen by examiners, as on-screen marking usually reveals little more than the printed lines.

Question 1 *(Standard Demand)*

The great majority of candidates recognised that the question was asking them to describe osmosis and to relate it to the particular context.

(a) The mark scheme allowed those with a reasonable knowledge to gain all three marks. Most candidates realised that the swelling of the cell was due to water entering. However a small minority of candidates lost this mark by suggesting that water was moving into 'the plant, 'the root' or even 'the stomata'; the examiners were however, lenient when specific cells such as 'guard cells' or 'palisade cells' were named, although some candidates appeared to suggest that water entered cells through the guard cells or

stomata, which 'open to let the water in'. Disappointingly a significant number of candidates failed to get this mark by explaining only that water moved through the cell wall / membrane, without stating the direction of this movement. A second mark was awarded for those candidates who could name the process or "osmosis" or even "diffusion", although both this and the first mark were denied when reference was made to the movement of solutions, salts or sugars into (or out of) the cell. Again a high percentage of candidates gained this mark and for those that didn't name either of the specific processes an alternative route was allowed for describing the relative concentrations inside and outside the cell. Had a mark been available for this description alone, then relatively few candidates would have gained it, as many gave tangled explanations involving mixed descriptions of 'water concentration' and '(solute) concentration'. Although it may be easier to introduce the process of osmosis in terms of water concentration, candidates should also recognise that the term 'concentration' alone refers to solutes. A few candidates correctly referred to water potential and their answers, which often went on to refer to turgidity and even an explanation of pressure potential, showed a far deeper knowledge than is required at GCSE. Hopefully these candidates will take their studies in Biology beyond GCSE. A less common component of most answers was a reference to a 'partially / selectively' or 'semi' 'permeable membrane', without which, of course, osmosis will not happen. Despite these potential pitfalls, a good proportion of candidates acquired all three marks. Those candidates who scored no marks in part (a) often got the scale of the situation wrong, suggesting that water was being taken in through roots and passing through the xylem towards the leaves.

(b) This part proved to be relatively straight-forward for most candidates, who referred to 'the cell wall' often describing its composition to explain why the plant cell would not burst. However weaker candidates often threw in a variety of additional cell parts, notably chloroplasts and vacuole, in the hope that one might be right, but these unfortunately lost all chance of a mark. It was surprising how many candidates suggested that the vacuole 'stored water' and that this alone would 'prevent the cell expanding further' or that the vacuole has the characteristics of the 'Tardis', with an infinite capacity to take in water without increasing volume.

Question 2 *(Standard Demand)*

Only a few candidates failed to gain any marks in this question and the majority scored at least two marks with many, pleasingly, gaining all three. Successful answers were generally concise and displayed full use of the information given at the start. It is often useful for candidates to number or bullet responses where several different suggestions are required. In this way candidates can be more certain that they are making appropriate, separate and creditworthy points. There was evidence that an increasing number of candidates use this technique in answering questions of this nature. Three marks were available here for answers that covered both advantages and disadvantages.

Implied use of 'less transport' for UK tomatoes was commonly seen. Fewer candidates, however, went on to pick up a second mark by linking this with 'less pollution' from increased fuel use. The idea of UK tomatoes being 'cheaper' as a result was often given but gained no credit. Many raised the valid point of the economy or local farmers being supported by 'buying British' and this was given a mark. As is frequently the case, many answers were simply too vague. By saying the tomatoes 'do not have to be imported' candidates were not quite hitting the 'less transport' idea. Similarly, responses such as 'less damage to the environment' and 'more environmentally friendly' were commonly seen in weaker answers but failed to fully address the more precise 'less pollution'. Ideas that the tomatoes would be 'fresher', 'less likely to be contaminated with pesticides' or 'have more nutrients' were not credited as there was no evidence for these. Neither did more inventive answers such as 'it rains a lot in the UK so the

tomatoes will be healthier', 'tomatoes are available when people eat salads' and 'they will be better than those being "deported" from other countries'!
Most candidates correctly decided that lack of availability throughout the year was a considerable drawback. Fewer, however, picked up the point that growing tomatoes in greenhouses often required the use of heat and light. Even fewer went on to mention that the production of this heat and light could in itself lead to pollution. Candidates should be encouraged to use every piece of information given in the question and to read details of tables and graphs carefully. In this case it seemed that the key alongside the graph was given only a cursory glance by most students. Only a small number of answers, therefore, managed to match the second and third disadvantage points. Some students equated growing in greenhouses to be 'unnatural', 'artificial', 'unethical' or 'less efficient'. Others argued that, with less warmth and sunshine in the UK, tomatoes would be 'fewer', 'smaller' or 'of poor quality'. None of these responses gained credit.

Question 3 *(Standard Demand)*

Considering the amount of time candidates must spend carrying out practical work, and practising and completing coursework assessments, many components of this question generated disappointing results. Questions of this nature are common on this paper, yet many candidates appear not to have prepared adequately for questions concerning experimental design and technique.

(a) Poor appreciation of the investigation described in the question let many candidates down. The difference between a control variable and the independent variable (which must be maintained for each part of the investigation) was not well understood. Thus a high percentage of candidates chose 'temperature' as a control variable, when it is this that is the independent variable. When faced with questions of this nature, candidates might use some of the spare white space around the paper to indicate for themselves which are the independent and dependent variables and thus try to avoid such errors. Others suggested 'time', the dependent variable, so that what was intended to be a straightforward one-mark introduction became a more demanding task for far too many candidates.

(b) This part proved to be more straightforward, with a high proportion of candidates choosing the correct alternative, options 1 and 3 proving to be fairly equally popular. Inevitably a number of candidates failed to notice the emboldened "one" in the question and ticked more than one box, with one candidate, possibly convinced that he or she could not fail, ticking all four boxes.

(c) Answers to this part were less reassuring. This was one of the situations where recognising the meaning of the command word could save a considerable amount of time and effort. "Describe" does not require an explanation and no marks were awarded for those parts of the answers which gave details about kinetic theory or denaturation and often candidates, having got half way through their answer on the right track diverted onto a wrong one. Answers such as 'the time gets less up to 35 °C but then the enzyme denatures' only scored the one mark. Interestingly, many candidates appear to believe that complete denaturation occurs instantly at 40 °C, an idea not borne out by the information in the table. Examiners accepted answers with mixed descriptions of time and rate, with 'the reaction gets faster, and then it takes longer' being a common way of gaining both marks. Many candidates appear to defy basic laws with answers such as 'time gets faster', leaving examiners wondering what they meant, although there was usually sufficient evidence in the rest of the answer to award marks to answers such as these. Poor English often made it difficult for examiners to determine what was being described for 50 °C, whilst others wrote about the events at 95 °C.

(d) This part required candidates to review the experimental details and suggest how the design of the investigation could have been improved and a wide variety of answers was available for candidates to use. So it was surprising how many candidates suggested investigating different independent variables, with 'make the volumes of lipid and lipase the same' being common. Furthermore, many candidates, who at least chose the right direction for their responses, gave answers that were too vague; thus 'a bigger range of temperatures' indicated that temperatures below 5 °C or above 95 °C should have been tested, some going as far as to specifically suggest carrying out a further trial well below 0 °C. In addition, the suggestion to 'test more temperatures' failed to provide sufficient detail as these also could be outside the range given. Further indication of a loose grasp of terminology came from those candidates who suggested 'a larger range' but then explained what they meant with 'use 5, 10, 15, 20…', although examiners looked on this type of answer generously. Further misunderstandings were evident from those candidates who suggested 'keeping the interval for temperature the same' as this could imply having an interval of 20 or 30 °C. A few candidates recognised that the five minute interval between tests for lipid was too long, some going into good explanations as to the advantage of reducing this interval. One final way in which candidates failed to recognise the significance of what they were writing were those who suggested using different scales for time, thus 'use seconds, not minutes' is essentially meaningless as a 300 second interval between tests would not improve the investigation, only make the numbers bigger! Those candidates, who used their experience in coursework, gained one of the marks for suggestions of carrying out replicates or repeats of the investigation, often going on to explain how calculating means or identifying anomalies could be achieved (although for no additional credit as these were not asked for).

(e) (i) A high proportion of correct answers was given in part (e)(i), the majority of candidates including 'denaturation' in their response, with relatively few of the acceptable alternative terms. Good candidates were able to demonstrate their often excellent knowledge here, describing the way in which enzyme molecules are denatured and the consequences of this on the potential to form an enzyme-substrate complex, knowledge well beyond the expectations of the specification, although hopefully this will help those candidates who continue past GCSE. Although the use of the one-time common 'killed' has generally declined over the last few years, there were those who, usually having described or quoted denaturation, then lost the mark for the last word in their answer.

(e) (ii) Most candidates realised that the products of lipid digestion would be 'fatty acids and glycerol', the most commonly selected distracter being 'amino acids'.

Question 4 ***(High Demand)***

(a) (i) Here the question required candidates to explain how mitochondria help a sperm cell to carry out its function. It was, therefore, not enough to simply write 'they are the sites of respiration', as this does not link the mitochondria to a function in sperm cells. Candidates had to go one step further to state that 'they release energy'. Although it was acceptable to use synonyms such as 'provide', 'supply' or 'give' in lieu of 'release', the all too common references to the idea of energy being 'produced' or 'made' were not credited. No mark was awarded either if candidates said that mitochondria 'contained energy' or that the energy they released would be 'used in respiration', this latter being another common misconception. Some candidates gave very confused answers implying that respiration 'made glucose' or 'provided the cell with oxygen'. Many answers were too vague, referring to mitochondria being needed to 'help the sperm swim',

whilst others simply gave incorrect roles such as 'protein synthesis' or 'contains the genetic information'.

(a) (ii) Under half the candidates had the correct idea and gave an answer which implied that the nucleus contained only half the usual number of chromosomes. Candidates occasionally failed to read the question properly, however, and saw it as a continuation of part (i) asking for a function rather than a difference. Answers such as 'carries genetic information' or 'controls the activities of the sperm', therefore, gained no credit. It was quite common to see responses which gave a comparison between sperm cells and body cells in terms of size, shape or position of the nucleus, with a particularly common idea that the 'nucleus of the sperm cell is bigger (than that of a body cell)' showing that the concept of scale had not been considered or that 'it is not in the middle', indicating that candidates take basic cell diagrams as representing all cells.

(b) Many candidates conveyed the idea that stem cells are able to form other types of cells. Fewer, however, made the points that they are unspecialised or that they have the capacity to divide, the latter being seen only rarely. Some answers failed to gain credit because the language used was too loose or vague. Consequently, no marks were given for answers such as stem cells 'have no function' or 'can be made to do jobs' or 'can be turned into anything needed'. Incorrect ideas included stem cells 'have no DNA', 'contain chemicals to cure diseases', 'make humans immune', or 'help to repair damaged cells'. Some candidates, unfortunately, focused only on the two words 'embryo' and 'disease' in the question and mistakenly answered in terms of genetic screening, whilst a few implied almost magical, cure-all properties on these cells, describing them as 'fighting disease'.

Question 5 ***(High Demand)***

(a) Poor interpretation of the graph or of the question cost many candidates a potential mark in (a)(i). Although the graph gave information about oxygen production, the question was phrased in terms of the rate of photosynthesis. Thus, those who answered only in terms of the former were not credited. There were many candidates who mistakenly believed that at carbon dioxide concentrations greater than 0.15 % photosynthesis stops. Another common error was to read the scale incorrectly and quote '1.5 %' or even '15 %' carbon dioxide. At this stage in the paper candidates are expected to give more than the basic 'rise, then level off' type of answer and examiners were looking for quotation of the 'at 0.15 %' in addition. Sadly, only around a quarter of candidates could rise to this expectation. There were many candidates who required additional space to continue their answers on both this and part (a)(ii) but made little effort to inform the examiner of where this answer might be, often finishing in mid-sentence, leaving the examiner to hunt around for the continuation.
Those who struggled to identify even the basis of the relationship in part (a)(i) were inevitably at a disadvantage in (a)(ii). However it should be noted that in the new version of the specification questions will have to be phrased in a 'describe and explain' way, giving candidates even fewer clues as to what is required in their answers. Candidates often defined "limiting factors" adequately, but failed to identify which were the limiting factors in the two parts in the relationship. Others misinterpreted the "low intensity" label as implying that light intensity must be the limiting factor at low carbon dioxide concentrations, and then suggested a different factor at the higher concentrations. The majority of candidates did not recognise that the higher rate of photosynthesis (or oxygen production) caused by increasing carbon dioxide concentration showed that at this stage in the relationship, carbon dioxide itself was the limiting factor. Although many realised that at higher carbon dioxide concentrations,

increasing carbon dioxide had no additional effect on the rate of photosynthesis, and so a different factor must now be limiting, relatively few could pin this down, exclusively, to light (intensity), as shown by the further increase in photosynthesis when light was increased.

(b) Some examiners felt that many candidates gained the first mark in part (b) by default. It would also seem that many found a further way to misinterpret the graph, assuming that the scale for oxygen concentration began at zero. Many candidates who gave the correct answer 'decrease' for the effect went on in the explanation to suggest that they really meant 'less of an increase' as they implied that the white regions of the leaf would photosynthesise to a lesser extent than the green regions. Although a good proportion of candidates gained one mark for explaining that the white regions of the leaf would not photosynthesise thus there would be no change in oxygen concentration only very few of the better, more astute, candidates realised that the white parts of the leaf would continue to respire (as would the green parts), using up oxygen from the tube and that this would cause a decrease in oxygen concentration.

(c) Answers to this part were more encouraging. Many candidates recognised that turning green would result from an increase in chlorophyll and that this would lead to an increase in photosynthesis. Some only gained one mark for one of these ideas, whilst others referred to both chlorophyll and photosynthesis but did not convey the idea that there would be 'more' of either of them. A surprising number of candidates suggested that chlorophyll would move out of the green areas of the leaf, into the white areas, which would of course defeat the purpose, as this would result in more or less the same total amount of photosynthesis.

Question 6 ***(High Demand)***

(a) It was expected that the great majority of candidates would be able to correctly offer 'Aa' in part (a), which was a precursor to part (b)(i). However this was not the case and little more than half did so. The most common errors involved giving only one allele, usually 'A' or giving the phenotype 'round', despite the question asking for alleles. Other candidates offered the examiners the unacceptable choice of at least two genotypes.

(b) (i) The consequences of the omissions in part (a) were frequently not manifested in part (b)(i). Many candidates who gave the wrong answer in (a) went on to show the correct cross here. Although many candidates gained at least one of the three marks, less than one in five were awarded all three. The context of the question was Mendel's second cross, which involved plants from the seeds of the original offspring. Candidates were asked to explain the results obtained from this cross only, by using a genetic diagram. It was impossible, therefore, to award more than one mark (for correct derivation of offspring) if answers included more than one option and gave no guidance to the examiner as to which to select; perhaps by indicating 'first cross' and 'second cross'. The high numbers of seeds referred to seemed to distract some students. They failed to spot the 3:1 ratio and then gave what they believed to be a cross which could result in the largest proportion of wrinkled to round seeds. It was, therefore, common to see answers which assumed the parental genotypes had been AA and Aa. Correct derivation of offspring from the gametes in such a cross gained the maximum of one mark only. Other mistakes included the occasional use of two alleles in gametes. The mark that many failed to pick up, however, was the final one for the identification of both round and wrinkled offspring. Candidates often thought that acknowledging the wrinkled outcomes was enough. They were perhaps thinking of recent exam questions which have asked for an indication of the one

child who had a genetic disorder. Some answers here did, in fact, refer to the 'aa' outcome as 'the sufferer'. Students should be encouraged to match all genotypes and phenotypes in genetic diagrams. It is also important to emphasise the need for clarity in answers of this kind. Gametes should be obvious; casually drawn lines from parental genotypes may not be sufficient and the use of a Punnett square may prove to be a safer option. In addition, it is better to rewrite answers rather than try to alter letters given in a diagram; examiners cannot be left to decide whether a candidate means 'A' or 'a' in such cases. Only a very few candidates used alternative letters, these were only given credit when a key was also given.

(b) (ii) Many candidates implied that Mendel had made errors in his cross 'he used AA and Aa by mistake', had 'crossed the wrong plants' or had cheated to get his final 3:1 ratio and that this result had 'found him out'. Other answers suggested the misconception that 'some of the wrinkled genes became dominant', presumably misunderstanding the term 'dominant' or the infrequency of mutation. Some candidates carried their experience in coursework tasks into this question, suggesting that the results were an 'anomaly'. Other responses got closer to the essence, but were too vague. Neither 'the ratio is not always exact' nor 'we cannot accurately predict the outcome' or 'fertilisation is random', explained exactly why the numbers failed to match. Good candidates showed clear appreciation of the ideas of chance and probability.

(c) A number of candidates gained the mark by answering in terms of genes and/or DNA being unknown at the time, so Mendel lacked supporting evidence for his theory. Some candidates missed out by only stating that the technology was not sufficiently developed, or incorrectly that microscopes had not been invented. Others said that at this time inheritance was not recognised, although the "blending theory" had been used in selection for quite some time. Very few referred to his publication being restricted in circulation. The most frequent incorrect response was that Mendel was 'not a scientist', which he certainly was or that he was 'only a monk' (or, according to one candidate, 'only a nun'!).

Question 7 ***(High Demand)***

Questions concerning the control of body temperature appear frequently on this paper, yet few candidates seem to have prepared adequately, as many repeated the misconceptions seen in previous examinations. Candidates are encouraged to use past papers as part of their preparation, but when doing so, should also include mark schemes and examiner's reports in the material they use. Only the complete package will point them in the right direction and avoid repetition of past errors.

(a) (i) Many candidates struggled to get anywhere near the correct spelling of 'thermoregulatory', with a whole variety of strangled alternative suggestions. Those who did manage to achieve this sometimes failed to add 'centre' to the term or substituted this with incorrect terms such as the common 'gland' or 'system'. Although there was a range of potential pitfalls, it was disappointing that appreciably less than half of the candidates could name the part correctly.

(a) (ii) Although many candidates referred to 'receptors' in part (a)(ii), these receptors were very frequently described as being 'in the skin', so no mark was awarded for this reference. These candidates then went on to describe how the brain receives information via 'signals in nerves' from the skin, missing the whole focus of the question, which was about "core body temperature", here referred to for

the fourth time in the question, yet missed, or ignored, by so many candidates. As a result a disappointingly low number of candidates scored even the one mark, this usually for reference to the monitoring of 'blood temperature'.
Many candidates demonstrated a poor understanding of temperature control. It was common for examiners to see references to 'muscles rubbing against one another producing heat from friction' as a description of shivering. Further weak terminology such as muscles 'constricting', 'shaking' or 'causing the blood to run faster' also failed to gain credit. Candidates also failed to recognise that even when they are relaxed the cells in muscles continue to respire, and gave the impression that they believed respiration or the release of heat only occurs during contraction. Responses such as 'respiration occurs when muscles contract' or 'contraction releases heat' therefore only gained the one mark for 'contract'. These candidates failed to realise that 'more' respiration will be taking place during contraction or that 'more' heat will be released. Examiners are looking for some precision in what candidates write and cannot award marks for what candidates might mean from their answers. As such, candidates should carefully consider their responses before committing them to paper, or at least carefully check that what they have written is precisely what they mean. However, there was the opportunity for those candidates who missed the description of 'more' to gain this mark if they included both 'respiration' and 'heat' in their answers. Inevitably there were those candidates who referred to 'energy', rather than, or perhaps as well as, 'heat' and amongst these there were many who lost the opportunity of the mark by once again describing energy as being 'produced', rather than 'released'.

(c) A significant proportion of candidates assumed that the walker was a permanent drunkard and although this did not necessarily affect their answers it led to some extreme answers, such as one who believed that the walker would 'stay in the water until his liver stopped working'.

(c) (i) This part was phrased in such as way as to avoid large numbers of candidates referring to changes in capillaries, however this did not stop many doing so. The suggestion that capillaries 'dilate' is incorrect as these blood vessels have no muscle in their walls. It was again disappointing that fewer than half of the candidates could describe that these blood vessels dilate, or 'widen', rather than the vague 'get bigger / larger' (as this hints at them becoming longer). It is likely that a significant proportion of those candidates who failed to gain this mark lost it because they referred to blood vessels 'moving' through the skin, as answers such as 'they dilate so get closer to the skin' were commonplace. This is yet another of the misconceptions that seem to be so embedded in the minds of candidates that it appears impossible to shift and will continue to lose marks.

(c) (ii) This misconception was often repeated here, again costing one of the potential marks. Reference to more blood flowing at / near the surface or to blood flow nearer to the surface were, however, both acceptable descriptions of why hypothermia might occur sooner in the walker. These candidates often went on to explain that the walker would consequently 'lose *more* heat'. A considerable number of candidates failed to see the link between parts (i) and (ii) here and as a result did not carry their thoughts concerning changes in blood vessels through to this part. Instead these candidates chose a different tack, discussing the 'slowing of reactions', the walker 'not realising he was in the water' or 'being too intoxicated' to get out of the water. Once again, these candidates assumed that the "walker had been drinking alcohol" in the question meant that he was completely incapable.

Question 8 *(High Demand)*

(a) Required a relatively simple calculation involving nothing more, in fact, than mental arithmetic. The calculation, of percentage, was intended to act as a clue that candidates should refer to percentage or proportion, rather than raw figures, in part (b). Blank responses were not uncommon, however, perhaps because students gave up at the first hurdle when they had forgotten to bring a calculator. They should be reminded that a correct attempt at working out can often gain one mark even without a final answer being given. Better still, though, they should come to the exam with the right equipment. Many managed to gain both marks, however, and this was pleasing to see. The most common slip was to mistake the 'energy from food' as being the total energy listed in the table under the heading 'large insect'. Candidates then calculated 0.64 as a percentage of 9.6 rather than of 4. Other errors were mathematical in nature rather than failures in interpretation.

(b) The final question, proved to be very challenging to all but the most able students. Very few gained all three marks and many failed to achieve any. Ideally, candidates should have linked the idea of less respiration being required to release energy for temperature regulation in the insect with the idea of more energy, therefore, being available for growth. Appropriate data to back these ideas up would have allowed the award of all three marks. Some gained a mark for 'no temperature regulation' in the insect or that the mammal is 'warm blooded'. Some gained a mark for the correct use of data (although it should be said that many failed to make any reference to figures despite the clear request to do so in the question). Few gained the final mark where the link had to be made with 'more energy available for growth'. One common mistake was a failure to appreciate what was meant by the word 'proportion'. Candidates looked at the figures in the table and decided that so much energy seemed to be lost from the mammal in faeces that this was likely to be the cause. The actual proportion of energy lost from the insect in this way was, in fact, far higher than that in the mammal. Another error was to have overlooked the fact that both animals ate grass – a point that was made both in the question context and in the table itself. Several candidates, therefore, answered in terms of energy losses in a food chain, believing that the mammal was a consumer of the insect. Others took a slightly different approach by saying that the mammal hunted its prey and, therefore, required more energy from respiration as a result. Some made the mistake of implying 'energy use in respiration'; others incorrectly wrote down that 'energy was produced in respiration'. When either of these ideas was coupled with otherwise appropriate data references the mark could, unfortunately, not be awarded. It was pleasing, however, to see so many candidates really try hard to find an answer to this question. Some responses were very inventive. The idea that insects required more energy for growth as they regularly 'shed their skins' was quite often seen, though in some ways disappointing that they knew this about insects, which is not on the specification, but did not realise that mammals use energy to maintain body temperature, which is on the specification. Some referred to 'more common attacks by predators' necessitating more energy being needed to 'repair tissues'. Some even related this to 'more knocks and abrasions received when insects clambered through undergrowth'!

Mark Ranges and Award of Grades
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