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Examiners' Report / Principal Examiner Feedback

January 2010

GCE O

GCE O Level Biology (7040) Paper 01

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7040/01 Biology Paper 1

Question 1

Part (a) of this question allowed candidates to get off to a confident start. Many scored maximum marks, no doubt helped by the stimulus material provided. Weaker candidates tended to misread the question, ignoring the bold in the stem. As such, they wrote about the functions of arteries and veins and gained no credit. It was pleasing to note the excellent understanding shown by many of the part played by various blood vessels in circulation. In part (c), most appreciated that capillaries are only one cell thick, but only the better candidates wrote about their permeability, their abundance in tissues or the slow flow rate of blood inside them.

Question 2

Calculation of ratios in this question proved problematic for most candidates. Candidates need reminding that examiners are not allowed to do the mathematics for them, so, for example, 160:151 is not acceptable. Most candidates appreciated that the normal allele was dominant because all the offspring had normal wings but answers to the genetic diagram showed a more variable performance. The examiners were looking for a clear indication that the parental genotypes were both heterozygous. Many struggled to show this, often confusing their chosen allelic letters with X and Y sex chromosomes. Incorrect parental genotypes scored zero but marks were available if the candidates correctly described the gametes and offspring thereafter. In part (c)(iii), only the better candidates made reference to random fertilisation or gave some indication of how vestigial wings might have a detrimental effect on survival. Conversely, most candidates appreciated that vestigial wings would have a detrimental effect on the song produced making the male flies less attractive to females.

Question 3

Most candidates were able to name a plant. Animal or insect was accepted as the group the housefly belonged to. Naming a bacterium was difficult for most candidates, with *Rhizobium* and *Lactobacillus* being the most common correct answers. The names of bacterial diseases were not accepted. Only the better candidates knew that Mucor is a fungus.

Question 4

This question challenged students on their understanding of the nitrogen cycle. A pleasing number of candidates appreciated that the process shown as 2 in the diagram was nitrification and most recalled that nitrates are used to make amino acids which are then used to make proteins for growth. Part (b)(i) expected candidates to appreciate that there would be less food available if the aquarium became overpopulated with fish and that the additional waste would encourage bacterial growth and consequent oxygen depletion. Part (b)(ii) proved to be more challenging but the better candidates realised that a reduction in plants would result in less photosynthesis and therefore less oxygen which would impair the ability of the fish to respire. Credit was also given if the candidates appreciated that less nitrate would be absorbed by plants, or that there would be fewer plants to feed on.

Question 5

Candidates struggle to give an accurate description of the term 'diploid number', often believing it is the total number of chromosomes, or the total number in a cell – patently not true when one considers gametes. The examiners were looking for evidence of 2n, however expressed. Most candidates appreciated that there would be 30 chromosomes in the gametes of *S. maritima*, and that sterile, in the context of this question, meant that reproduction was not possible. A pleasing number of candidates understood that *S. townsendii* has 61 chromosomes making pairing to produce gametes impossible. In part (e), most appreciated that plant roots help to stabilise the mud, ensuring that coastal erosion and subsequent habitat destruction would be prevented. In part (f), most understood that the loss of bare mud would cause a reduction in the population size of birds and invertebrates because their food source would be diminished as a result of the destruction of their habitat.

Question 6

Many appreciated that in the secondary immune response antibody production is quicker to appear in plasma, rises faster, lasts longer and more antibody is made. Those candidates who lost marks in this question did so because they struggled to express these points clearly enough. Only the best candidates drew a curve that mirrored that of the primary response and started between 100 and 102 days.

Question 7

Part (a) was surprisingly difficult for candidates most struggling to note that six different species of predator were named in the passage. Many appreciated that there were 143 cows involved in the calculation for part (b), but most failed to divide by the correct number of years. Many were able to think of acceptable answers to explain the deaths of farm animals in part (c), and in part (d) most candidates gained both marks, but a surprising number drew complicated diagrams involving every animal mentioned in the passage, or several not mentioned, with the arrows going in all directions.

Question 8

The fact that 40 locusts were used in the investigation caused some confusion but calculating the average mass of grass eaten was less of a problem. Part (b)(i) was found to be very difficult. The examiners were looking for an appreciation that collecting results in a shorter time is quicker and gives more opportunity for repeats. It also helps to reduce error that might result if the locusts eat all the grass before the end of the 24 hour period. This event would result in a lower value being calculated, a value that would be inaccurate. Many appreciated that the cotton wool prevents the escape of the locust while allowing gas exchange to take place. Many candidates failed to name three acceptable variables that should have been kept the same. Candidates need reminding that they will not gain credit if they name controlled variables that have been named in the rubric of the question. In part (c) most appreciated that increasing temperature increases the mass of grass eaten as a result of greater activity and consequent respiration.

Question 9

Most candidates are able to recall the cellular components of plant cells and most were able to explain osmosis, though the expression of concentration was often confused. A pleasing number of candidates appreciated that root hair cells are long and have a large surface area to assist with water uptake. Candidates found part (c) to be the most challenging. Many chose the root hair cell as the one with the highest concentration of solution and cell 2 as the one with the lowest. Thereafter, more correct responses were noted, with candidates appreciating that Cell 2 is nearest to xylem and that the root hair cell has the highest availability of water.

Question 10

Most candidates were able to deduce that smaller men have a higher heart rate but in (b)(i) most failed to calculate the correct percentage increase, perhaps lacking confidence in writing a figure higher than 100. If their answer was incorrect, credit was given for noting the numbers 140, 68 or 72 in the working. Most candidates were able to explain why the heart rate needs to increase during jogging in order to supply the muscles with the oxygen and glucose needed for respiration and to remove the toxic waste product of carbon dioxide. The provision of the formula in part (c) enabled most candidates to calculate the correct answer of 25 857. If their answer was incorrect, credit was given for noting the numbers 117 or 221 in the working. In (c)(ii), a large number of candidates wrote about surface area to volume ratios, which were irrelevant and misleading. They often contradicted facts mentioned in the question. The correct responses were simple, but far too many went off on the wrong track and dealt with far more complications than necessary. The most common correct responses made reference to small men having a smaller heart and pumping less volume per beat. Better candidates also made reference to the fact that there were fewer cells, meaning less demand for glucose and oxygen for respiration.

Question 11

This question tested pupils on their understanding of the kidney. Part (a) was correctly answered by the vast majority of candidates, with most being able to explain the sequence of events that make urine darker as a result of exercise. Recognition of the role of sweating, its affect on blood plasma concentration and the need for water reabsorption were quite common responses. Many appreciated that swimmers would be in water but only the best candidates appreciated that this creates a problem for the evaporation of sweat. Part (d) was fairly easy for most candidates with carbohydrate for energy being the most popular response. Similarly, part (e) seemed straightforward with sweat from the skin and carbon dioxide from the lungs being the most popular correct responses.

BIOLOGY 7040, GRADE BOUNDARIES

Grade	A	B	C	D	E
Lowest mark for award of grade	**136**	**118**	**100**	**90**	**67**

Note: Grade boundaries may vary from year to year and from subject to subject, depending on the demands of the question paper.

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