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General Certificate of Secondary Education

Biology 4411

BLY3F Unit Biology 3

Report on the Examination

2009 Examination – January Series

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Biology
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General

There were a number of particular problems which occurred quite frequently which included the following. A lack of understanding of certain topics, eg kidney function and anything to do with microorganisms, including biogenesis. Paying insufficient attention to information provided in the stem of a question in order to guide a reasoned response

Careful reading of the question to ensure this was the question actually answered eg if certain topics are specifically excluded, as in question 7(b), then no marks are available for inclusion of these topics; and if the precise opposite of the actual question is construed then the answer will inevitably be incorrect.

There was mathematical weakness, both in calculations and in reading information accurately from a graph

Lack of appropriate terminology eg organisms like bacteria may be killed at high temperatures rather than being denatured while enzymes and other proteins are denatured rather than being killed; or something being affected by an experimental procedure gives no indication whether an increase or a decrease is intended.

Question 1 (*Low Demand*)

Most candidates answered part (a) well, with the majority knowing that an artery carried blood away from the heart and that substances entered and left the blood in the capillaries.

Part (b) caused more problems, the main error being that many thought the peculiar feature of a red blood cell was that it lacked a cell membrane.

Question 2 (*Low Demand*)

In part (a), most knew that carbohydrates were an energy supply for the growing bacteria and that sealing the Petri dish with adhesive tape was to keep out air-borne microorganisms.

Most candidates also knew in part (b), that the dish should be incubated at 25^{o}C, although fewer appreciated that use of this temperature would make it less likely that pathogens would grow in the dish.

Question 3 (*Low Demand*)

In part (a) only a third of candidates realised that the volume of water in the urine had to be subtracted from the volume of water filtered from the blood, ie 180 – 2 = 178 dm^3, in order to find the volume of water reabsorbed back into the blood. A common error was to divide 180 by 2. This revealed very weak understanding of the functioning of the kidneys or poor mathematical ability.

Similarly in part (b), only a fifth of candidates managed to complete the table correctly to show what happened to the amount of water reabsorbed and the concentration of the urine in different situations.

Question 4 (*Low Demand*)

In part (a) the fact that yeast, rather than a bacterium or a mould, produced ethanol was well known.

Six points of information about properties of ethanol and of petrol were provided for candidates in part (b). Although most could select two advantages of using ethanol as a fuel in motor

vehicles, very few could offer an adequate explanation for each of these, or the explanations they offered were inadequate. These included petrol producing more pollution than ethanol with no specific details of named substances or their effects. However, most appreciated that the lower energy yield from ethanol was a disadvantage.

Question 5 (*Low Demand*)

In part (a) the vast majority of candidates correctly selected the figures relating to the steepest part of the line on the graph as indicative of the time when penicillin was being produced most quickly.

Descriptions of the change in the concentration of glucose in the fermenter over the first 30 hours were rarely worth the two marks available for part (b)(i). Most recognised that its concentration decreased but further details were frequently imprecise and sometimes indicated that the oxygen concentration line had been considered in error. In such questions, candidates should quote at least some numerical data but should also aim to do so as accurately as possible.

Although nearly all candidates selected at least one correct description of the relative changes in oxygen and glucose concentrations for part (b)(ii), only just over a third could correctly choose two from the four options given.

In part (b)(iii), the majority of candidates were able to choose aerobic respiration as the process that uses both glucose and oxygen.

Question 6 (*Low Demand*)

The majority of candidates found this question quite difficult.

In part (a)(i), only half of the candidates appreciated that the broth was heated in an attempt to sterilise it. To get rid of microorganisms was a common weak response, while some even thought the heating might have provided ideal conditions for the growth of bacteria.

Only a fifth of candidates in part (a)(ii), realised that microorganisms grew in the broth either because of inadequate prior heating or due to contamination from the surrounding air.

Approximately half of the candidates in part (b) made at least some headway in comparing the details given for Spallanzani's investigation with those of Needham's by describing and/or explaining how more thorough heating and/or better sealing helped to prevent the growth of microorganisms.

In part (c), only a tenth of candidates recognised that Spallanzani's investigation provided evidence for the theory of biogenesis.

Question 7 (*Standard Demand*)

In part (a)(i), just over half of the candidates were able to complete the calculation of the cardiac output successfully.

Explanations in part (a)(ii), of the muscles' need for more oxygen were often very weak sometimes being just to help them work better, with no reference to either respiration or energy.

Part (b) asked for changes other than those already encountered in earlier parts. Nevertheless, many candidates insisted on mentioning the increase in heart rate or blood supply to the muscles which were the subject of part (a). More appropriate answers related to increased depth and/or rate of breathing, although many just referred to changes in breathing or more breathing with inadequate qualification.

Question 8 (*Standard Demand*)

Less than half of the candidates correctly named the process required for part (a) by which plant leaves lose water as either transpiration, evaporation or diffusion. Errors included osmosis, transportation, respiration, photosynthesis and even distillation. The latter being one of the distractors in question 5.

In part (b) about three quarters of the candidates successfully interpreted the data which showed that condition D warm and windy, resulted in the most rapid loss of water from the plant. However, explanations of this observation were much less successful: most of these related to the wind blowing the water (vapour) away. Many implied that evaporation had not occurred in the other conditions.

Question 9 (*Standard Demand*)

As in question 6, answers here were generally very weak.

Less than half of the candidates knew in part (a) that a high temperature would have killed the bacteria or denatured their enzymes and hence cooling was needed before adding any bacteria. Some did not read the question carefully and answered in terms of the benefits of heating to 80^{o}C in order to kill microorganisms.

In part (b)(i) only about a fifth of candidates were able to write anything sensible about what caused the pH to fall during yoghurt production. It was clear that many did not understand the concept of pH and were not sure that a fall in pH implied more acidic conditions. Others thought the bacteria were acidic.

The usefulness of the fall in pH in yoghurt production was also a mystery to many in part (b)(ii). Correct references to improved flavour and to preservation of the yoghurt were accepted.

There was more success with the concept of refrigeration in part (c) as almost half of the candidates realised this would help to preserve the yoghurt.

Mark ranges and award of grades

Grade boundaries and cumulative percentage grades are available on the **Results statistics** page of the AQA website.