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General Certificate of Education

Applied Science 8771/8773/8776/8779

SC14 The Human Body

Report on the Examination

2008 examination - January series

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General Comments

At this third sitting of the Unit SC14 examination, again, most prepared candidates managed to gain credit across most areas of the paper, although some areas were handled surprisingly badly. The latter could perhaps be explained by the fact that some topics presented in this paper have not yet been tested, so there has been little practice. Areas of strength were found in performing basic calculations and data interpretation. Knowledge and understanding of physiological processes and general scientific principles e.g. of sodium regulation, cardio-respiratory function, and digestive processes are requiring improvement. Again, the specification requires candidates to be able to explain these and other basic biological processes. Candidates should be encouraged to use scientific language in appropriate contexts as there are still instances of candidates failing to gain credit because of vague responses to questions and not giving reasons or explanations. Due to an error in the paper, one mark was not accessible to candidates. The paper was therefore marked out of a total of 79 and this was taken into account when grade boundaries were set.

Question 1

This is the first time thyroxine, salt and sodium regulation have been explicitly tested. On the whole, the question was answered badly, and many candidates demonstrated no knowledge or understanding of these topics, scoring zero.

(a)(i) Few candidates could recall the thyroid produced thyroxine, and many put pancreas.

(ii) No credit was given for errors carried forward. Many hedged answers with increases metabolism/decreases metabolism. Answers that simply stated metabolism were given no credit.

(b)(i) Candidates either knew exactly what the role of iodine was, or put inaccurate guesses.

(ii) Few were able to give one sensible answer for the function of salt in the body.

(iii) Few were able to give sensible answers here.

(iv) This question was a good differentiator. Many candidates wrote about ADH activity here, when the regulation of sodium uptake by aldosterone was what was requested. No credit was therefore given.

Question 2

This question was generally well accessed.

(a) As one may expect, this was generally well done, with candidates correctly labelling mitochondria. Common errors were labelling the nucleus or cytoplasm.

(b) An error in the responses provided within this question, meant that the available mark was inaccessible to candidates. This question was therefore discounted from the paper total. A letter has been sent to all centres who entered candidates for this unit (January 2008). For further clarification please contact the subject team.

(c) Most candidates were able to calculate the number of ATP molecules required. Credit was given if a candidate showed working but then added up wrong [one out of two marks]. No credit was given if the wrong number was written and no calculation was shown.

(d) Few could explain how lipids enter Krebs cycle. Better candidates could at least identify that lipids are broken down to supply glycerol and fatty acids, but then got stuck, and were not make the next link to the Krebs cycle. Less able candidates wrote about fat digestion in the gut. No credit was given in this instance. Overall, a good differentiator.

Question 3

Cardio-respiratory anatomy and physiology continues to elude a great many candidates. Credit was given to candidates who were at least able to generate a sigmoid curve on the graph.

(a) A reasonable number of candidates could identify coronary arteries.

(b) Most gave a sensible answer for this question.

(c)(i) No credit was given for stating 'oxygen saturation monitor'.

(ii) Most good candidates could state that this is a non invasive technique.

(iii) Most well prepared candidates selected the correct answer for a normal saturation.

(iv) Partial credit was given if candidates could at least construct a sigmoid curve. Full credit was only awarded if this was to the right of the original.

(d) Following on from part (c)(iv) some candidates were seduced into describing the Bohr effect and haemoglobin, which of course did not answer the question. Other less well prepared candidates wrote at length about central control of breathing. Very few candidates recognised this required description of the buffering of carbon dioxide, despite the pointer in the stem relating to the blood.

Question 4

Candidates with good arithmetic skills performed reasonably well on this question.

(a) Most candidates identified that boiling would kill harmful bacteria.

(b)(i) The main difficulty encountered here by less able candidates was conversion of kilojoules to Megajoules. Partial credit was given in these instances. No credit was given for selecting the formula milk figure for calculation.

(ii) No credit was given for answers stating 'approximately 3 times' – some evidence of calculation had to be shown, or the correct answer.

(iii) Candidates performed badly with this part of the question, and clearly were guessing. Whilst the values are not explicitly stated in the specification, like those for glucose, the candidates are required to recall them.

(iv) Most good candidates completed this successfully. Some stopped at calculation of 122.4, so were given credit.

(v) Good candidates knew the percentage was lower.

(c)(i) Many candidates were able to supply a sensible answer for this.

(ii) Less able candidates transcribed the foods, when they had been asked for the micronutrients.

(iii) Few candidates were successful with this question.

Question 5

This aspect of the digestive process had not been explored in the two previous papers, apart from the use of disclosing tablets. It was surprisingly badly done, with many vague answers.

(a)(i) Even less able candidates were able to gain some credit here, usually by gaining marks about mechanical digestion. Overall, it was clear that a great majority of candidates do not understand these processes are about increasing surface areas of foodstuffs for digestion, and for making large insoluble molecules become small and soluble. Much was written about making food slippery by saliva. Spelling of saliva is variable.

(ii) This was universally badly done, with many vague answers demonstrating a poor understanding of the natural flora of the mouth and their effects on oral health. Many wrote that swallowing these bacteria would make you ill.

(b) Most good candidates were able to describe the use of disclosing tablets and state how you could evaluate their use. Less able candidates missed off the evaluation, which made this a good question to differentiate candidates. There is a common misconception that yellow teeth are unhealthy.

Question 6

Most candidates could evaluate the data, but many clearly did not fully understand the relationship between a high haematocrit, and haemoglobin level and aerobic capacity or the basics of carbohydrate biochemistry.

(a) This was well answered, with candidates gaining credit for comparing the male and female athlete data.

(b)(i) Most could identify the female athlete at risk of amenorrhoea.

(ii) Most correctly identified athlete D and could state reasons related to his blood biochemistry and oxygen transport abilities for their selection. Some incorrectly selected female athlete J. Partial credit was only given in this instance if justification of selection was similar to that for D. Some candidates selected subject F who had the highest blood values, as the one at greatest risk of fatigue, which clearly demonstrated misunderstanding of the blood results. No credit given for any explanation in this case.

(c)(i) & (ii) These were linked. Many vague answers, gaining partial credit appeared. Most could not state that the pasta meals were complex carbohydrates, although knowledge that these foods were used for 'carb-loading' and were slow release was evident. These answers needed to be developed to gain full credit. Similarly, knowledge that the glucose gels and cereal bars provided 'instant' energy was there, but little relation to carbohydrates was made. Many candidates did not look at the applied nature of using these foods and so did not make the connection that some were easily digestible and could be eaten during the race.

Question 7

Knowledge of the digestive system was tested in this question, and generally this was answered very poorly. Many candidates scored zero for this question, giving vague and inaccurate answers about gut function.

(a) Many vague answers stating 'absorption and digestion' were given here, and gained no credit.

(b) It was evident that while candidates knew that peristalsis was used to propel food through the gut, they could not give a detailed physiological explanation of the process. No credit was given unless the candidate explicitly stated that alternate contraction of circular and longitudinal muscles occurred. Some spoke of incomplete circles of cartilage constricting, demonstrating confusion with the structure of the respiratory system.

(c)(i) &(ii) This was very badly done, and many candidates clearly did not know the function or consequence of B3 deficiency. This is included in the specification.

Mark Ranges and Award of Grades

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