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General Certificate of Secondary Education
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Human Health and Physiology 44151H

(Specification 4415)

Unit 1: Topics in Human Health and Physiology (Higher)

Report on the Examination

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General Comments

There were thirteen questions in the paper. Of these, questions one to seven were targeted at grades C and D. Questions eight to thirteen were targeted at grades B, A and A*.

Questions one to four were common with the foundation paper.

The introduction to the subject content (section 3.3) on page 8 of the specification makes it clear that many of the questions will be set in the context of the work of health professionals. Many students, who were otherwise well prepared, failed to appreciate the nature of the work done by these professionals.

Schools and colleges are also reminded of the booklet 'Notes on the Scope of the Subject Content'. This booklet indicates the depth of treatment required for many of the topics in the specification. There were several instances where students' answers generally fell short of the required depth.

Students should be advised to follow the rubric on the front of the question paper and write in black ink or black ball point pen only. The scanning process involved in online marking does not pick up pale colours well. Furthermore, students should be advised to ensure that if their answers extend beyond the printed lines or space then they should keep these extensions away from the edges of the page as they may be removed during scanning.

Fundamental knowledge and understanding of How Science Works in the world at large, as well as in the laboratory, were tested throughout this paper. This means that students should be reminded that it is essential to read all of the question carefully, analyse the information provided and think about their response before writing their answer.

Question 1

(a) Most students gave a correct example of a viral disease, but many viruses were attributed to bacterial diseases. A large number of students were unfamiliar with the term 'protoctistan' and failed to give an example of an appropriate disease.

(b) Although most students were familiar with methods of preventing the entry of pathogens, many simply repeated the stem of the question eg 'skin prevents the entry of pathogens' rather than stating that skin acts as a barrier. A significant number of students gave descriptions of the actions of white blood cells which were not relevant in this context.

Question 2

(a) Many students appeared not to understand the term control variable and gave instead the independent and the dependent variables.

(b) Only a minority of students gave 'line graph' rather than 'scattergram'.

(c) Most students recognised the plot for the fittest student, but some opted for the one with the highest recovery heart rate.

(d) Though the data was clearly well spread out, many students concluded 'the higher the mass, the higher the recovery rate'.

(e) Though most students gave reasonable suggestions, many again gave the dependent or the independent variables. Others gave answers that were too vague to gain credit eg ‘diet’ or ‘exercise’.

(f) There were many excellent accounts involving the link between blood supply to the muscles, increased oxygen, respiration and energy. Many students, though, gave answers in terms of breathing and failed to mention muscular activity.

(g) Most students gave satisfactory responses in terms of more exercise or less ‘energy food’ but many again gave vague answers such as ‘diet’, ‘eat healthily’ or ‘lose weight’.

Question 3

(a) It was surprising that significant numbers of students could not name the capillary, giving vague answers such as ‘vessel’.

(b) Significant numbers of students described the mechanism of ventilation rather than describing the diffusion of oxygen into the blood and of carbon dioxide into the alveoli.

(c) Most students gave correct descriptions of the differences, but many clearly equated alveoli with cells and described ‘thicker cell walls’.

(d) In part (i), most students recognised the differences in residual volume and expiratory reserve capacity, but many clearly did not understand the data and answered in terms of tidal volume. In part (ii), most students were able to carry forward at least one of their observations in part (i), but many could extend this to include the effect on gaseous exchange.

Question 4

(a) Many students gave acceptable answers in terms of ‘taking time off work’, but many gave answers in terms of the effect on the health services.

(b) A majority of students did not understand the basic difference between the work of a chiropractor and that of a physiotherapist. Essentially, a chiropractor is concerned with manipulation. Many students gave the answer ‘massage’ for both parts (i) and (ii).

(c) In part (i), there was the inevitable confusion between spine and spinal cord. Many students did not know the term ‘vertebra’. A minority of students confused nerve with neurone. In part (ii), ‘bones rubbing together’ was a popular response that was clearly not supported by the drawing.

Question 5

(a) Almost all the students gave correct nutrients in parts (i) and (ii), but many gave simply ‘vitamin’ rather than ‘vitamin C’ in part (iii).

(b) A surprising number of students ignored the instructions and gave answers in terms of deficiency diseases or symptoms. Most students referred to iron or to red blood cells in part (iii) and a majority gave correct answers in terms of healthy skin or improved night vision in part (i). However, the functions of vitamin C and sodium ions were much less understood. Schools and colleges are referred to the Additional Guidance in the specification for acceptable functions of these two nutrients.

Question 6

(a) This part provided little difficulty for most students, but a surprising number opted for the rock concert or the piano fortissimo in part (ii).

(b) Almost all students recognised the negative correlation in the data, but many did not go on to give a full description that included the halving of the safe exposure time by a 3 dB rise in noise level.

Question 7

(a) Many students confused the right and left sides of the heart in both parts (i) and (ii), whilst others ignored the sides and simply gave 'atrium' and 'ventricle'. In part (iii), a majority of students correctly stated that valves prevent backflow, but significant numbers answered in terms of valves forcing blood through. Only the better students went on to refer correctly to atria and ventricles.

(b) In part (i), a majority of students lost marks by describing the build-up of cholesterol or fatty deposits in veins or capillaries rather than in arteries. Most students appear to think that in a heart attack the artery is blocked by cholesterol / fat rather than by a blood clot. Further, most students answered in terms of a reduction in blood flow rather than the blood flow being cut off. In part (ii), a significant number of students answered simply in terms of 'it makes the heart stronger / healthier'.

Question 8

(a) To gain full marks an answer to an evaluation question should involve pros, cons and a reasoned conclusion. The conclusion should be at the end of the answer and should refer to both pros and cons. Few students responses satisfied all these criteria. Most students referred to the ethical issue involving the use of a small boy, and to the number of lives saved subsequent to the investigation. However, argued conclusions were very rare.

(b) Most students knew what was meant by artificial immunity, but weaker students merely mentioned 'injections'. Relatively few students gave good descriptions of natural immunity, perhaps a majority stating that it was acquired through hereditary means. Similarly, passive immunity was frequently described as being hereditary.

(c) In part (i), significant numbers of students simply repeated part of the stem of the question 'a tablet that does not contain the drug' rather than applying this information and describing the injection of an ineffective liquid. In part (ii), most students did not understand the implications of the word 'reliable', instead concentrating on the different numbers of participants in the trials, rather than the large numbers involved. In part (iii), most students referred to either the number of participants who contracted HIV, or to the relative 'success' of the placebo, but few students referred to both of these.

Question 9

(a) More able students usually had no problem in gaining full marks by stating that amino acids were deaminated into ammonia which was then converted into urea. The only common error amongst these students was to give protein rather than amino acids. Weaker students usually confused urea with urine and went on to describe urine formation in the kidney.

(b) In part (i), many students lost marks by stating 'water content of blood' rather than 'low water content'. In part (ii), better students usually described increased reabsorption of

water and increased concentration of urine, but only a minority referred to a reduced volume of urine.

(d) Only the highest-scoring students were able to cope with this part of the question. Most students attempted explanations in terms of kidney functioning. Others described urea being 'drawn out of the blood' rather than the diffusion of urea from a high concentration in the blood to a lower concentration in the dialysis fluid. Similarly, these students usually stated that sodium ions were absorbed by the blood 'because they were needed'.

(e) An overwhelming number of students correctly chose CPD and were able to support the choice with at least two acceptable reasons. A minority of students chose IPD, but their reasons contradicted the data provided and therefore received no credit.

Question 10

(a) FSH was usually correctly named for X in part (i), but there was much confusion between oestrogen, LH and progesterone for Y and Z. In part (ii), most students correctly gave 'follicle', but weaker students usually gave 'egg' which did not gain credit. In part (ii), most students referred correctly to the stimulation of oestrogen production, but many lost the second mark by referring to egg production rather than maturation. Parts (iv) and (v) were well answered by more able students, but weaker students usually answered in terms of eggs or follicles.

(b) Able students often gained full marks by referring correctly to the stimulation / inhibition of some or all of the four hormones and the effects of stimulation / inhibition on the ovary. Weaker students tended to ignore the instruction to refer to the ovarian cycle and instead described events in the uterus.

(c) Part (i) provided no difficulty for most students, but only the better students realised the significance of the accuracy range of the hCG test. The accuracy of the test means that an hCG concentration of 18 (at week 5) could give a negative result, so that the earliest time the test is accurate is at 6 weeks.

Question 11

(a) Parts (i) and (ii) provided little difficulty for most students except for those who described the data rather than explaining it. Weaker students gave weak answers such as 'diet' in part (i) or 'activity' in part (ii).

(b) In part (i), most students referred correctly to diabetes and either arthritis or heart disease. Vague answers such as 'heart problems' and 'mobility problems' were not given credit at this level. In part (ii), most students gained one mark for stating that the NHS would require further resources, but relatively few went on to argue that this would result in the need to prioritise resources within a limited budget.

Question 12

(a) Only the most able students were able to give an explanation in terms of sex linkage. These students usually gained all five marks. The vast majority of students seemed unaware that the Duchenne allele would not be found on the Y chromosome, and gave explanations leading to person 9 being double recessive for Duchenne. Students who went down this road were limited to a maximum of three marks. However, many of these students, who constructed correct Punnet squares, failed to identify the double recessive and received only two marks.

(b) Again, students who did not give an explanation in terms of sex linkage were limited to a maximum of two marks. These students often stated that parent 7 might be a carrier.

Question 13

(a) Most students showed little understanding of genetic engineering techniques. All that was required for full marks was to state that enzymes are used to cut out the gene for collagen production from human genetic material and to insert it into yeast genetic material. In spite of being asked how yeast cells could be modified, many students described the modification of bacteria which were then stated to be grown in fermenters.

(b) To gain full marks, students were required to evaluate the use of 'yeast' corneas compared with plastic corneas and with transplanted corneas. Many students only referred to one or other of the two types of cornea. Few students gave any disadvantages of the 'yeast' corneas. Very few students lost marks due to poor communication skills.

Mark Ranges and Award of Grades

Grade boundaries and cumulative percentage grades are available on the About Results pages of the AQA Website.

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