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Human Health and Physiology 44152

(Specification 4415)

Unit 2: Investigations in Human Health and Physiology

Report on the Examination

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Administration

Most schools and colleges submitted a complete, well-presented sample for moderation well within the May 7 deadline. All moderators are aware of the time needed to satisfy AQA's instructions regarding the administration of the moderation procedure, and are very grateful that most schools and colleges do a very good job in presenting their students' work.

A small number of schools and colleges did not complete the paperwork as expected. Where this happened the main deficiencies were:

- forgetting to include a signed Centre Declaration Sheet
- forgetting to include an ISA Explanation Sheet
- entering an incorrect mark on the Centre Mark Sheet.

Schools and colleges are reminded that full completion of the front page of the ISA Written Test now means that there is no need for students to complete an individual Candidate Record Form. A number of schools and colleges unnecessarily completed both.

The moderator team was pleased that the great majority of schools and colleges completed the paperwork correctly and in full, and there were very many instances where the moderator benefited from thoughtful work by the school or college.

ISA 1: Energy from food

Question 1

(a) Students did not have difficulty with this question with almost all scoring the mark.

(b) Most students knew that this was supposed to be the categoric variable, but a few incorrectly thought it was continuous.

Question 2

Most students commented on the mass of food and the amount of water to be used or the distance the food was held from the boiling tube. The mass of food was allowed if the teacher felt that this was indeed a control variable used in their experiment.

Students should be encouraged to use the term 'volume' rather than 'amount' or 'level of water'. Vague comments concerning the use of the same equipment should not have been awarded a mark. For example, 'set up of equipment and flame'.

Question 3

(a) Again, most students scored a mark here either with thermometer or measuring cylinder.

(b) The majority of students correctly thought the answer to be 'precise', but a few answered 'reliable'.

Question 4

(a) Most students achieved a mark here for realising the results would be more reliable. Some also mentioned accurate as well as reliable and, therefore, should not have been awarded a mark. Others pointed out that anomalies could be spotted but very few said 'remove anomalies' and even fewer said that that it would minimise random errors. There was an increased use of the term outliers rather than anomalies.

(b) Most students managed to correctly describe how to calculate this value but some provided vague statements about adding them all up and dividing by the number you had.

(c) Over-marking occurred here when teachers failed to check the students' results. Often **mean** results were the same due to class results having been collected, which was perfectly acceptable, but the student needed to pick the food with the **largest mean temperature increase**. Mistakes happened here when calculations had been completed for energy per gram, the students then chose the food with the most energy from their graph rather than the food which resulted in the greatest mean increase in temperature.

Question 5

This was expected to differentiate between students. However, most seemed to manage to get three marks here. Students from the same centre tended to make the same three comments.

Over-marking occurred here due to the same point being made more than once, especially concerning the loss of heat to the surroundings or marks given for very vague comments about where the heat energy was actually going.

The transfer of heat energy into light energy was allowed a mark, if the teacher had given it, as although this would be quite a negligible value it was in fact a correct idea.

Question 6

The table should be marked **before** the student enters their results and it is strongly advised that their blank table is **not** used, but a teacher generated table is given to them instead. This way there is less likelihood of all tables from the same school or college being identical. Tables need to be designed under controlled conditions and, therefore, it would not be expected that all students from the same centre had the same table design, particularly when it was more complex than it needed to be including loss in mass, energy value per g and temperature increase.

Again, graphs must be produced under controlled conditions. In some instances, the scales used and the labels on the axes were exactly the same for all students at a centre, this would not be expected if conditions were tightly controlled.

Most students were able to achieve 6 marks with some losing marks for lack of units or not labelling the x-axis as well as each bar (ie types of food and biscuit, wotsit, cereal etc.). Teachers should be more vigilant in the marking of tables and graphs as this is the point where, if schools or colleges are tending to be a bit generous with their marking throughout the paper, they can end up falling out of tolerance.

Teachers are reminded that students should **not** write additional information on their tables or graphs which would give them an unfair advantage over others in the ISA Written Test. There were instances of the IV and DV appearing on the tables and graphs. Some even included a method for their investigation here which they should **not** have had access to during the ISA Written Test. If the students' own table was not given back to them for the ISA Written Test then this would automatically remove this problem. Please see the Teachers' Notes (page 4): 'students' work should **not** be annotated with additional information, by either the teacher or the student, which would give them an unfair advantage during the ISA test, eg the use of the terms independent /dependent variable'.

If computer generated tables and graphs are to be used then there **must** be annotation from the teacher to explain how this was conducted under controlled conditions. Some tables

appeared to have been tidied up on the computer and then full marks given for the design of a table that had been altered from the original rough one. Computer generated graphs were worthy of fewer marks due to the lack of grid lines or properly labelled axes.

Question 7

(a) Most students answered 'mounted needle', but some circled 'metal forceps' because this was what they had used in their experiment. Students were expected to realise that a suitable piece of apparatus would not be one which was a good conductor of heat and therefore even if they did use metal forceps in their experiment it was not the correct answer.

(b) A lot of students were quite vague here with comments such as 'if it boils then you can't get the right results' or 'it evaporates when it boils'
Correct answers should have been about the lack of further temperature increase, some did go on to explain impressively that this was due to the changing state from liquid to gas and why there would be no further increase recorded.

(c) Marks were lost when the student failed to mention if the volume of water or mass of food they would use would be more or less – simply stating 'change' was not enough. Some thought they should use colder water, this was allowed if the teacher gave a mark, as it was assumed that they did not change their water between tests and, therefore, the water would not have started at room temperature – annotations would have been helpful here.

A few students thought it would be a good idea if the food was moved further away from the test tube. This was allowed if the teacher had given a mark. It would decrease the likelihood of the water boiling, but would not be an appropriate way to change the method and was therefore given a 'D' mark by moderators.

Question 8

(a) Answer correctly calculated by almost all students.

(b) Most students spotted that the 'change' was the important factor here.

(c) Few students managed to achieve two marks here, some either picked up a mark for the comparison idea or for the fact that you could calculate the energy content. Some instances of over- marking occurred when vague statements concerning fair test were given a mark.

Question 9

Most students were able to give an answer concerning the use of an insulated container, but often the second point was too vague for a mark. Others picked up a mark that was not in the Marking Guidelines by comparing it to their own experiment where the food had to be moved from the ignition source to the water. However, a mark was only available if this point was made clear and not for example: 'as the heat from the burning food is transferred into the water, it will give precise results'.

Question 10

Either good attempts were seen or attempts containing lots of irrelevant workings out. Often moderators were able to agree more marks than the centre here if the student had calculated correctly and clearly stated that the difference was 20 not 30%. Instead of pointing out that it was a difference of 4 g between the two biscuit types (which very few did) they stated that the value for low fat should have been 6 g less at 14.00 g to be 30%.

Question 11

There were not many answers worthy of four marks. Some over-marking occurred here particularly when the group consisted of one person or they all ate an apple before each meal or they chose to use an overweight person and an average weight person. Control variables were often well detailed with students realising that all participants needed to do the same amount of exercise and eat the same diet (other than the apple). Also the collection of data in terms of the starting and finish weight of the participants was well addressed although the time for the trial was often too short to show any significant effects.

Some students simply described how to test the apple for its energy content, this should not have been awarded any marks as it did not answer the question. Others decided that a diet of only apples would be a good way to lose weight, with one group only eating apples whilst the other group ate a normal diet.

ISA 2: Lung Capacity

Question 1

The Teachers' Notes specifically stated that the IV had to be continuous. There were a surprising number of schools/colleges who chose gender or smoker/non-smoker. This gave them an unfair advantage when plotting a graph as only two bars were needed rather than a line graph and if they had used smokers then they would already have been well clued into Q12.

Question 2

(a) This part was usually well answered, although sometimes too vague for a mark such as 'volume of water'.

(b) There was some evidence of over-marking here for incomplete descriptions or descriptions that would not actually work such as forgetting to actually invert the graduated container of water into the bowl before blowing down the tube.

Again, the Teachers' Notes were not always followed. Schools and colleges were supposed to use a water displacement method to allow students to answer this question fully. If 'lung bags' were used then only a very simple description could be given. Therefore, access to all three marks was not available. It also meant that students were at a disadvantage when it came to Question 11.

(c) Over-marking occurred here when the teacher did not check the results table.

Question 3

Generally, weak answers were seen for this question, which were not worthy of a mark. Most incorrectly described the difficulty they had with keeping the water in the container before the person blew into the tube or they thought that the amount the person could 'blow' out was difficult to control.

Question 4

The majority of students ticked the correct box.

Question 5

(a) Trends were often difficult for the students to describe very clearly due to the scatter of their results; hence one mark was the norm. Some were able to go on and point

out why they thought there was no correlation and use the data effectively for two marks.

The trend may have been made easier if, once the continuous data had been collected, the students had then grouped their results into the tallest and smallest individuals or under 12 years old / over 12 years old / over 18 years old for example and used these results to produce an additional bar chart.

(b) One mark was normally achieved here with the idea that they had repeated their results in order to check them. Few went on to comment on the closeness to the mean. The use of error bars here, although not a requirement, did help one school to answer this very well by comparing the size of their error bars.

Over-marking occurred here when the centre felt that fair test comments were worthy of a mark or the fact that they repeated them three times for a reliable test was worthy of two marks.

Question 6

Table headings could either give the 'start volume of water' and 'end volume of water' (with appropriate units) or just 'the total volume of water displaced in cm^3'. If the container was filled to the top each time then it was often easier to simply read off the end volume which was in fact the total volume displaced, therefore there was no need to record the start volume.

Graphs were often difficult to complete with an appropriate line of best fit due to the scattered nature of the results collected. Students should have commented on their graph that there was no correlation and therefore no line possible. They could then still be awarded full marks even though they had not been able to produce a line of best fit. Those schools and colleges who failed to follow the specific guidance in the Teachers' Notes regarding the use of a continuous variable had an unfair advantage because all the students had to do was plot two bars on their graph, clearly much simpler than the line graph that others struggled with.

Please see the earlier comments for Question 6 in ISA 1 regarding the similarity of tables and graphs and the need to conduct this stage of the ISA under controlled conditions. Also, earlier comments regarding computer generated tables in ISA 1 are applicable to ISA 2.

Question 7

(a) Generally, this part was well answered; students clearly know what is meant by an interval.

(b) Most students were able to state a variable such as 'if they smoked' or 'how tall they were'. The second part required an explanation which clearly showed an understanding that control variables needed to be the same for a fair test. Vague comments such as 'their lung capacity will be different' should not have been awarded a mark. To realise that the more someone smoked, the higher the chance that their lung capacity will be lower, would have been acceptable.

Question 8

Most students were able to answer this question correctly. The use of outliers rather than anomalies was noticed here.

Question 9

(a) This part was well answered but, occasionally, students made mistakes.

(b) Spotting similarities was fairly straightforward for most students.

(c) Most students were able to give one difference and then repeat this idea again for the second mark. Over-marking occurred here when teachers failed to spot that it was indeed the same comment made twice or that the difference was irrelevant. Sometimes a mark was missed when the student correctly used values obtained from the graph to compare the two sets of results. For example, 'the mean lung capacity of non-smokers goes up to 3.10 whereas the smokers is only 2.64'.

Question 10

Very few students had problems with either part of this question.

Question 11

Reasons given were usually to do with precision and accuracy or the ease of use/mobility due to not needing any water.

Question 12

Students were very good at pointing out control variables that needed to be considered and how to measure the lung capacity (using ideas from Question 11). They also gave detailed descriptions of repeating the test three times and removing anomalies before calculating a mean. Sample sizes were not so well considered with only one female in each group or no control group with which to compare. Most teachers noticed these failings and marked appropriately.

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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