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General Certificate of Education (A-level)
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Human Biology HBI6T

(Specification 2405)

Unit 6T: Investigative and Practical Skills

Report on the Examination

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General comments

Once again, the overall standard of marking improved as more centres responded to the advice offered in their feedback. Thoughtful ways of responding to different ways of answering questions were welcome when they followed the Marking Guidelines. Some answers were accepted which were not on these guidelines and should not have been accepted; there were fewer examples of this approach this year. One or two markers did not check that they had given full credit when longer questions were being assessed and deprived their students of a mark or two.

Most marking was carried out in red, with marks being recorded in the margin. If this is not done, it makes it more difficult to check at moderation. Many markers added a number next to the tick to indicate which marking point was being credited, an approach that was requested and much appreciated. Extra notes and annotations were equally gratefully received; they can make a difference when marks are marginal.

Internal moderation is an essential practice when more than one teacher is involved in the process. If different marks awarded for the same question are shown on the paper, the accepted mark should be made obvious. Paperwork was generally submitted efficiently, but checks should always be made to ensure that all candidate numbers are recorded.

Presentation of the work was generally pleasing but plastic packs are time-consuming to insert and withdraw material. Please use cardboard folders or treasury tags; the latter save on postage and are most acceptable.

There were two options available and a number of centres appear to have given their students the chance to attempt both; they then submitted the best mark. A small number of centres left their trials until the last minute and found they had to phone for advice and an extension of the deadline. This is not good practice and led to some concerns over exactly which conditions made growing the bacteria successful. Some centres allowed the discs containing spices to dry out but when this problem was addressed, suitable results were obtained.

ISA P The effect of spices on bacterial growth

Stage 1

Tables were competently constructed by most students. The spices were named in column one, which was a better and more meaningful approach than using letters. The column titles were often long-winded but they gave the variable together with the correct units. Brackets are acceptable and were seen frequently. Very few students added a title to their table. This is not necessary but can help earn marks if column headings are inadequate. The use of the millimetre was the most frequent unit of measurement.

Stage 2

The null hypothesis offered no challenge to many students; skills in this area continue to improve. The statistical test was chosen and justified with confidence; showing good use of the Students' Statistics Sheet. Some centres marked harshly when a reference to the size of the sample was not made in the justification; this was not required for the mark. A few students offered tests not listed on the Students' Statistics Sheet; they should be encouraged to select from the ones offered. There were frequent slips made during the calculations and these were only spotted when markers checked rigorously. Some students were willing to accept the most outrageously incorrect answers as plausible! Whatever the statistical answer, this was used to consider the null hypothesis. Some students are still not in the habit of accepting or rejecting their null hypothesis and then going on the comment in the light of the probability of their results occurring by chance. Some markers gave full credit when these terms were not used.

Written Test: Section A

Question 5

The importance of the positioning of the filter paper was recognised by most and clearly explained.

Question 6

Reliability is frequently linked to repeats but students still often include reference to anomalies, often erroneously. Many still think that more repeats mean fewer anomalies, when the converse is likely to be true.

Question 7

The answers about the use of controls are improving and many were able to give a specific reason for the use of the plain paper. Weaker students left it to the marker to work out how the control actually worked and what should be compared with what.

Question 8

Most students recognised that the lid was to stop anything getting in or out but were not always certain exactly what. More suggested contamination from the outside than escape from within.

Question 9

Suggested variables were usually suitable. Occasionally, markers accepted answers which were not in the Marking Guidelines.

Question 10

(a) The film on the plate was recognised as bacteria, though an occasional candidate suggested the microbes were fungi.

(b) Good suggestions were made about the clear area but explanations as to what had caused it were less common.

Question 11

That the 'patch' was not circular was recognised as a problem by most.

Question 12

(a) The preference for the standard deviation rather than the range was explained by many. Weaker answers involved attempts to fall back onto learned definitions, rather than answering the question.

(b)(i) Mean diameters are well within the compass of most students.

(b)(ii) The use of standard deviations proved challenging, although good answers were seen where students quoted figures with confidence. A disappointingly small number of students made suitable reference to significance in their answers, suggesting that they had not used the standard deviations in an appropriate manner.

Written Test: Section B

Question 13

(a) More students than previously appeared to recognise the phrase 'use the data' as a prompt to quote figures in an answer. Some were very adept at manipulating the figures to show a percentage change. There remains a large number who cannot do this; centres are recommended to rehearse simple mathematics with students.

(b) It was clear that some centres had carried out this sort of work and their students readily recognised the need to count colonies in the absence of a microscope. Other students had little idea how to respond.

(c) Some assumptions were vague and one or two centres were inclined to accept suggestions which were not in the Marking Guidelines; this is not acceptable.

(d) This was another question which was answered better by students who appeared to have had experience with the technique. Other students struggled to explain what they meant.

(e) The use of a dilution factor was only appreciated by a minority of students.

(f) There were several options available to apply the idea of reliability and most were successful.

Question 14

(a) Students of all abilities are competent at describing results from a graph. They recognise that it is often important to make comment on the point at which a rate changes.

(b) The calculation of a percentage remains a challenge for too many students.

Question 15

(a)(i) Applying knowledge to the effects of soap was well done by most, as another example of the application of previously learned information.

(a)(ii) The effects of reheating food thoroughly are well known.

(b) Students continue to find evaluations challenging and they do not always consider the problem from more than one point of view. Weaker answers offer 'learned' answers from previous mark schemes. Better answers showed appreciation of the need to consider the scenario presented and not to rely on past experience. Some marking of this question was overgenerous, with markers crediting answers which were not in the Marking Guidelines.

ISA Q the effect of ageing on changes in pulse rate with exercise.

Stage 1

Students carried out the exercise with no apparent difficulty. Many tables were excellent but weaker students did not put data about the people in the first column. A significant number forgot to include the units for pulse rate.

Stage 2

Most students managed a clear hypothesis, knew which test to choose and were able to offer a suitable justification. All those moderated chose the correct test. All attempted the calculation, and many carried it out successfully. Markers were very diligent in checking the mathematics. The conclusions to the statistical work were variable and some students forgot to refer back to their null hypothesis. Some markers are still generous in awarding marks to students when they do not make appropriate reference to probability and chance.

Written Test: Section A

Question 5

This question was confidently answered and it was good to see reference made to the need for sufficient results to carry out a statistical test. Some markers thought other answers were valid and awarded marks; this is not acceptable, and risks moving the centre out of tolerance.

Question 6

Students expressed this idea in a range of ways but these were acceptable, as long as they meant that posture affects pulse rate.

Question 7

(a) As a standard question, this was generally well answered but some students remain confused about the effect of repeats on the number of anomalies. The term ‘mean’ was encountered more frequently than ‘average’, which was pleasing.

(b) Many students appreciated the need to allow the pulse rate to return to normal; no comments on getting rid of lactate were encountered during moderation. Once again, good reference was made to the statistical test possibilities.

Question 8

Students are becoming more accomplished at considering the reliability of the test or of the groups involved. They had many suggestions to make, most of which were in the Marking Guidelines. Although ‘gender’ was acceptable, the term ‘sex’ is more biologically correct. There were no references made to named drugs.

Question 9

‘Comparison’ was regularly offered and it was frequently appreciated that people do have different resting pulse rates.

Question 10

Some students, and some markers, switched round these two responses. Logic was well applied to both but explanations involving multiplying an error were often confused.

Question 11

(a) Marking paired answers remains challenging to some teachers and making reference to standard deviations was not easy for all students. Answers including a definition of the term were more plentiful than those which tried to qualify the usefulness of the figure. The term 'range' was used competently.

(b) This is another example of paired answers and another case where a few markers chose to pick from two pairs. Many students need to be made aware of the need to include the word 'more' when required in their answers, especially in comparative situations. This is a mistake which occurs quite often in all written papers.

Written Test: Section B

Question 12

(a) There were many good answers here. The idea of cardiac output being greater was accepted by some centres. Once again, it is important to credit only the ideas in the Marking Guidelines. The link to the heart was not made in any way in weaker answers.

(b) As an analysis of the data, this question was generally well done and many used data to support their descriptions. Only the best answers involved a comment about the relevance of standard deviation bars which do or do not overlap.

Question 13

(a) Most wrote accurately of older men and did refer to both X and Y.

(b) This was another place where confident students quoted data. Once again, the idea of 'more' was challenging to some. Comparing data sets could be time well spent in preparation for sitting an ISA exam.

(c) Students needed to scrutinise the data to answer this question and many found it challenging. They needed to look more at patterns and consider group composition. It was noticeable that some students offered answers they had encountered in previous Marking Guidelines, without relating them specifically to the present scenario. Sadly, some markers were found to have missed crediting their pupils with marks they deserved. It is important to keep to the Marking Guidelines but it is important that the same ideas, expressed in different ways, are credited.

Question 14

(a) Most students know that data have to be standardised to allow comparison.

(b) Calculations of percentage remain a challenge to students of a wide range of ability. It was clear that many experimented with the figures before deciding which combination to select. In many cases, it is the choice of denominator which causes the most difficulty.

(c) A final question in which some markers felt the need to add more answers to the wide variety of answers that were acceptable. Many students could imagine the situation in which the subjects found themselves and so could make evaluative statements. These answers were, on the whole, practical and realistic.

Mark Ranges and Award of Grades

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