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

(Specification 2405)

Unit 6: Investigative and Practical Skills

Report on the Examination

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General Comments

The standard of marking of the ISAs showed improvements in many centres, compared with 2010. It was clear that the great majority of teachers had read the Marking Guidelines carefully and applied them diligently when marking their candidates work. Most teachers employed the mechanics of marking and marking conventions detailed in the "Guidance for Teachers Marking Human Biology ISAs" which prefaced each set of Marking Guidelines. Where centres did not follow this Guidance, moderation was more difficult and more errors in the totalling of candidates' marks were seen.

In a few centres points not in the Marking Guidelines were credited, often being annotated as "valid". These points were often disallowed on moderation. Credit should be given to alternative wordings equivalent to points within the Guidelines, but not for points outside those given in the Guidelines.
Many teachers annotated their marking. This was of considerable assistance in moderation, especially in the case of marginal points.

It was pleasing to see clear evidence of internal moderation in samples from a number of centres. Internal moderation should be carried out wherever more than one member of staff is involved in the assessment.
All of the comments above were also true for AS ISAs and are discussed in more detail in the report for HBI3T.

Administration procedures were followed correctly by most centres but in a significant minority the Head of Centres Signature was absent from the Centre Declaration Sheet, delaying the processing of their sample.

In most centres each candidate's table, statistical analysis and Written Test were stapled together so that in effect there was a single document for each candidate. This makes the mechanics of moderation much easier than putting the work of each individual into separate plastic pockets or leaving sheets loose.

Of the two options available, Q (The effect of use on features of the arm) was nearly twice as popular as P (The effect of temperature on the rate of respiration of microorganisms such as those found in probiotic foods). A number of centres appear to have given their candidates the opportunity to attempt both options and submitting the better mark.

Stage 1

The great majority of the data tables were laid out competently with a full description of both variables either in the title or in the column headings. Units were generally stated correctly in the headings of the columns. Errors were more frequently seen in option Q where candidates were more likely to provide inadequate descriptions of variables, or to put the dependent variable column to the left of the independent variable column. Tables that had a first column with the number of the participant were acceptable providing the second column contained the independent variable. These were generally marked correctly by centres.

Stage 2

In many centres the standard of statistical analysis was good. The AQA "Student's Statistical Sheet" was used appropriately by most candidates to provide guidance or choice and method of statistical tests.
The two aspects of statistical analysis that were most frequently done poorly by candidates were statement of the hypothesis and interpretation of the test statistic. Where these were done poorly they were often marked too generously by centres. Although many good null

hypotheses were seen, it was not uncommon for general statements that did not specify the variables to be credited with a mark. Most candidates were able to interpret the test statistic in terms of acceptance or rejection of the null hypothesis. However, a significant minority did not explain the result in terms of the probability of the difference being due to chance.

HBI6T/P11
The effect of temperature on the rate of respiration of microorganisms such as those found in probiotic food.

Question 1

Most candidates knew it was important to equilibrate temperatures.

Question 2

The purpose of stirring the stock culture was widely understood. Some candidates used inappropriate terminology; for example, yeast solution.

Question 3

(a) Most candidates answered correctly in terms of denaturing enzymes or killing yeast. Disappointingly, references to killing enzymes or denaturing yeast were seen in a significant minority of scripts.
(b) Both the possible effect of heat on the colour of methylene blue and avoiding the warming of the water bath were frequently given as answers.
(c) Many candidates identified tube Y as a control, but failed to explain the way in which it served as a control.

Question 4

Many candidates appreciated the purpose of tube Z as a colour standard.

Question 5
Most candidates gained the mark. Those who failed to do so generally stated they waited a specific length of time, without referring to temperature.

Question 6

Most candidates were awarded the mark. All alternatives were seen frequently, apart from concentration of oxygen.

Question 7

As with the interpretations in Stage 2, there was a significant proportion of poorly expressed answers and evidence of over-generous marking by some centres.

Question 8

(a) This was generally well answered but, as with 3 (a), weaker responses referred to killing of enzymes or denaturing of yeast.
(b) Significant number of candidates thought wrongly that the cold would kill the yeast. Around half of candidates referred to stomach acid or pH, fewer identified protease as a potential cause of yeast's death.

Question 9
Nearly all candidates suggested a suitable method for randomised grouping.

Question 10

The standard of evaluation was generally low. This was surprising given that the marking points reflected fairly standard "How Science Works" responses.

Question 11

(a) Osmotic lysis was widely recognised and explained.
(b) The purpose of the polymerase chain reaction was understood by a large number of candidates. However, there was a tendency in some centres to award both marks for answers that did not give the first marking point, but gave the two alternatives for the second marking point. In such cases only one mark should have been awarded.
(c) Many candidates correctly described the use of a DNA probe.

Question 12

(a) Few answers gained the mark. Most made no reference to time.
(b) Many candidates gained the mark, usually for appropriate reference to competition of pH.

Question 13

Few candidates scored more than one mark, rarely considering factors other than time available for multiplication or the effect of temperature on multiplication.

Question 14

Few candidates provided a good evaluation. The number of disappointing responses to this question and question 10 suggests that many candidates might benefit from a greater emphasis on "How Science Works" in preparation for the assessment.

HBI6T/Q11:
The effect of use on the features of the arm

Question 1

Many candidates gained the mark for the idea of maximum size, or removing a variable. A few answers that were too general for credit were seen; for example, 'to make a fair test' or 'improve reliability'.

Question 2

Many candidates had difficulty with both parts (a) and (b). Some centres wrongly credited ideas not in the Marking Guidelines; for example, 'tighten the string until it makes a mark on the skin'.

Question 3
Most candidates stated that the wrist is smaller but many had difficulty expressing the relative proportion idea, or failed to state it at all.

Question 4

(a) The idea that
(a) the larger forearm circumference is due to muscles enlarging with use was very frequently stated but the second marking point, relating to little muscle in the wrist, was scored by a minority of candidates.
(b) Many candidates wrongly recommended discarding or ignoring anomalous results.

Question 5

Candidates often failed to understand part (a), with many thinking that the higher figure for the 18-22 year olds indicated that their arms were changing more rapidly that the older group. Despite this misconception, many gained both marks for part (b).

Question 6

(a) Most candidates knew that standard deviation is a measure of spread about the mean.
(b) About half of the answers gained both marks. A large minority of candidates answered only in general terms of improving accuracy without further explanation.

Question 7

There were many correct responses to both parts (a) and (b).

Question 8

The physiological basis of muscle fatigue and its disappearance did not appear to be well understood. Many candidates scored two or fewer of the five marks available. Some centres marked this question too generously, most frequently crediting a mark wherever the word lactate appeared in the answer.

Question 9

Around half of candidates gained the mark.

Question 10

(a) Most candidates recognised that strength decreased with age but many did not specify a particular age.
(b) Fewer than half of the candidates made either the correlation, or the not proving causation mark.

Question 11

Stronger candidates frequently gained full marks; most candidates scored two or three marks. It was widely known that calcium plays a part in muscle contraction, synaptic transmission and bone strength. Few candidates mentioned that vitamin D increases calcium uptake. Some centres wrongly credited the second marking point where answers referred to improvements associated with calcium but not also to the effect of taking both calcium and vitamin D.

Question 12

The Marking Guidelines gave four alternative responses, each consisting of one reason for one mark together with an explanation for the second mark. A little fewer than half of candidates gained two marks, and a similar number gained one, more often for the explanation than the reason. There were instances of markers wrongly awarding full marks for two explanations or two reasons.

Question 13

Effects of ageing on the musculoskeletal and nervous systems were widely known and many candidates used their knowledge to explain the increased chances of having a fall.

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