Version : 1.0

ASSESSMENT and QUALIFICATIONS ALLIANCE

General Certificate of Education

Human Biology 2406

HBI6T Investigative Skills Assignment (ISA)

Report on the Examination

2010 examination - June series

Further copies of this Report are available to download from the AQA Website: www.aqa.org.uk

Set and published by the Assessment and Qualifications Alliance.

The Assessment and Qualifications Alliance (AQA) is a company limited by guarantee registered in England and Wales (company number 3644723) and a registered charity (registered charity number 1073334). Registered address: AQA, Devas Street, Manchester M15 6EX

General Comments

As we moved into the second year of the new specification, centres and candidates encountered ISAs containing a statistical element to their data analysis. Candidates were supplied with the statistics booklet during the test, and many were clearly pleased to be able to rely on it. Candidates completing their second round of ISAs appeared more confident in their handling of questions about their technique. They responded well to the scenarios presented in Section B, and produced some pleasing answers. Once again, the standard of marking varied a lot from centre to centre. It is pleasing to see that many centres read the Marking Guidelines very carefully, and take the time to annotate work where marginal decisions are made.

Two ISAs were available to centres.

The first ISA involved significant work on the part of technicians as they prepared algal beads to investigate changes in the rate of photosynthesis. The instructions were followed carefully, and candidates carried out the correct task. It was worrying to receive queries about the preparation of the algal beads very close to the deadline for submitting the work; centres are encouraged to plan this important work as it becomes available in the early part of the autumn term.

The second ISA involved a very simple perception test requiring the recording of the number of hits of a container by a counter with one or two eyes open. A small number of centres misinterpreted the instructions, and their candidates measured distances which were not required. It was surprising that when this kind of error occurred all the candidates in the centre made the same error. These particular errors then lead to confusion over the statistical calculation as there were rather more factors to take into consideration.

A number of centres were able to offer their candidates the opportunity to attempt both ISA investigations, and some candidates may well have benefited from this approach.

The Marking Guidelines were used appropriately by a large number of centres but instances were found where marking was over generous. In these cases, part answers were given full credit and some elements of the statistical analyses were given full marks despite areas of consideration being missing. By far the majority of the marking was correctly carried out in red. A few centres need to remind themselves to match the number of ticks with the number of marks, record the marks in the right-hand margin, and transfer them carefully to the front of the ISA. Most centres remembered to add on the PSA marks.

Stage 1

Tables showing raw data were laid out competently in the traditional experiment involving photosynthesis, and conventions were readily followed. Units were generally sound, and many candidates chose to record large numbers of seconds rather than risk the problems of mixed units. Candidates tabulating data on the number of times their counter hit the container were more likely to make up idiosyncratic tables, moving the independent variable to unexpected places, and including units in the body of the table.

Stage 2

The statistical analyses carried out by many candidates were competent. The statistical test sheet was used extensively to good effect.

Many candidates are able to write a good null hypothesis, but in some cases their ability to express an idea let them down. When this happened, comparison was generally made between an inappropriate pair of variables. Sometimes no pair of variables was involved. The marking of the null hypothesis showed a similar level of uncertainty in some centres. Candidates are expected to produce a null hypothesis which relates to the investigation in progress; they should not simply state 'there is no difference between observed and expected results'.

Many were able to select the correct statistical test, and to justify their choice.

Markers have done a lot of work checking the calculations presented by their candidates, and this was much appreciated. The interpretation of the test was marked generously by a number of centres who gave full credit when no references were made to either probability, or chance. The Marking Guidelines were clear that both were required. Some candidates showed an excellent standard in their analyses.

HBI6T/P10: The effect of temperature on the rate of photosynthesis

Question 1

Most candidates knew that it was important to check the temperature in a water bath, and to do so regularly.

Question 2

Candidates linked light with photosynthesis but only the better ones appreciated that it was the light intensity that would change with distance, and that this would affect the rate of photosynthesis. The term 'amount' was accepted.

Question 3

Most answers were related to the practical aspects of the investigation, rather than to the size of the error in principle.

Question 4

(a) It was frequently recognised that the solution needed to be mixed in order to gain an idea of its true colour, and this was expressed in a range of ways by most candidates. Few made reference to the specific effect of the process of photosynthesis on the solution.

(b) This was expressed in a range of ways, with most candidates appreciating the need to avoid human judgement or error. Very few erroneously made reference simply to 'fair test'.

Question 5

The idea of a control was well understood by many, and suitable suggestions were made. Some confusion arose over the difference between what the candidates called 'algal' beads, and what they suggested as 'gel' beads. This was accepted as beads with and without algae, and so they were deemed suitable. The second point was less frequently earned as reasons were not given.

Question 6

Many candidates recognised the part played by photosynthesis, and the gas which was taken in. Descriptions of the correct pH change were often offered, although some were confused by the numbers on the pH scale.

Question 7

This well tested question was answered competently in many cases. 'Controlling' the pH was acceptable.

Question 8

As an exercise in recall, this question was answered to a pleasing standard by many candidates. Some centres could have been a little more generous in rewarding the use of the term 'enzymes'. Few made reference to the optimum pH.

Question 9

It was readily recognised by many that the standardisation of the results allowed comparison, but fewer candidates went on to earn the second mark concerning either the size of the field or the water content of the plants. A link had to have been made between the theory and the actual practical work carried out.

Question 10

This question enabled many candidates to score full marks if they read the resource through carefully. All the information they needed was there, and while a good number gained full marks, a disappointingly large number appeared not to have used the supplied information. Candidates should be reminded that this situation often occurs in an ISA paper, and that they should take every advantage. Regretfully, some candidates either tried to invent their own ideas, or they elaborated on just one point that they had noticed in the resource. Most answers were for the crop, which was acceptable.

Question 11

Most suggestions related to the large amounts of pollen, and the allergies they induce. This was a question which was easy to answer, and easy to mark. No references to well-being were noticed during moderation.

Question 12

(a) It was apparent that few centres had offered candidates experience in finding dry mass, as this question was not competently answered in most cases. Many answers tried to suggest the need for repeats, to improve reliability etc.

(b) As candidates had the statistical test sheet with them for all parts of the ISA examination it was disappointing that more did not score well in this question. Perhaps they did not understand that a method was required, and not an answer. There were mentions of critical values, but very few suggested working at a particular probability level.

Question 13

(a) Answers relating to greenhouse gases and global warming were much more frequent than those relating to pollution and energy use. 'Climate change' was accepted as an alternative to 'global warming'.

(b) This was better marked than most 'factor and explanation' questions. Candidates were able to explain themselves well and generally paired factors with explanations.

Question 14

Surprisingly, large numbers of candidates were not able to recognise and list consequences from the resources. They should be able to summarise data into biological ideas, but many stopped after one or two. Common answers included references to loss of habitat, and reduced diversity. Some scripts were marked rather generously for part of an idea.

HBI6T/Q: The effect of using one or two eyes on the perception of distance

Question 1

Candidates answered the question with confidence. Some marking was too generous, giving credit when there was no idea of comparing the distance of the container with anything else as a clue.

Question 2

Answers were more likely to dwell on the need to change only one variable rather than to control all the other variables; the mixed standard of marking reflected the difficulty in seeing the difference in some cases. Many recognised that height would have an effect on perception of distance, but few suggested how.

Question 3

(a) As at AS, there was confusion over the effect of anomalies. Running repeats does not decrease anomalies, nor does it give increased opportunities to see them and leave them out; many candidates think that is the case. Very few remembered that more data would enable a statistical test to be carried out.

(b) It was widely recognised that practice would enable the investigator to do better. Most markers realised that a short, clear answer could be worth two marking points but others only gave one.

Question 4

The container and counter sizes were both readily recognised as suitable variables to change in order to improve accuracy. Some markers gave a mark for each when they were alternatives. Thoughtful candidates appreciated that this would reduce the chance of hitting the target, and so improve accuracy. There were occasional confused references to precision and reliability.

Question 5

There were a number of correct answers offering stereoscopic vision. Binocular vision was also acceptable as a close alternative. Many candidates were able to give the idea of two images, or two angles.

Question 6

Candidates appeared to fall into two groups, those who did, and those who did not think that age would have an effect. Those who did expressed concern over the weaknesses of old age in rather vague terms and did not call on their biological knowledge. Some wrote of eye problems but would have improved their marks by naming specific conditions. Slower reaction times were suggested but they were not linked with the need for more time to make judgements. Rarely, comment was offered on the ability to judge distance not being age related, meaning that it need not be controlled.

Question 7

(a) Writing this null hypothesis appeared to be more of a challenge to candidates than writing the null hypothesis for their own investigation. Many failed to mention both eyes and handedness. The answers appeared to be challenging for many markers too and there were many instances of marks given for part hypotheses.

(b) Many candidates referred to the control of the left side of the body by the right side of the brain, and vice versa, but then struggled to make the link to the control of the hand by a side of the brain. A few gave excellent detail about the crossing over of nerves. Some work was given credit even if it failed to mention the eye, hand and side of brain.

Question 8

There was widespread recognition that two eyes were better than one. Few other marks were earned by most candidates. Most failed to make use of the relationship of the error bars, or to make numerical comparisons. Few recognised that light intensity made no difference. The responses suggested that more practice is needed in the description of data presented as a graph with more than one curve.

Question 9

(a) The answers to this question tended to be in bits and pieces, rather than factors followed by explanations. Candidates easily recognised factors that affected the investigator but rarely offered a suitable explanation. This trend was followed by a number of markers who tended to be over generous with part answers. Answers relating to alcohol were vague, often suggesting that it has 'an effect' without describing how.

(b) Candidates were able to think about the practical aspects of using the same group of people, and generally answered this question well. Some markers tended to read between the lines and give credit where it had not been earned.

Question 10

Candidates recognised the need to design an experiment with only one variable being allowed to change; they knew this enabled comparisons to be carried out. Most could also appreciate the effect of the same drug dosage being different on different body masses. The marking of this latter part involved various interpretations of candidates' answers which were generally effectively carried out. References to 'weight' rather than 'mass' were accepted but 'size' was not.

Question 11

As a 'How Science Works' question this produced a number of well rehearsed answers and marking scores were generally high. Most answers referred to comparisons between the conditions of the test, i.e. the drug dosages, the driving conditions and the control variables. Many mentioned the lack of information about the number of participants but few made comments about the source of the information, or about whether or not the results were statistically significant. There was some confusion over the Marking Guidelines, with answers to question 12 being credited here, and vice versa.

Question 12

As a second question which depended on the data in the resources, this too was well answered. There was no credit available for copying out parts of the resources, although it was given by some markers. This was particularly noticeable when 'postsynaptic impulses inhibited' was expected and not just the table heading from the resource. Some markers chose to number the marking points they were awarding which was much appreciated at the moderation stage.

General comments

Overall, candidates had acquired many of the skills expected at A2. They were generally competent in the use of statistical techniques when assessing their own data. Some struggled when trying to apply statistical concepts to data and scenarios provided in the written test.

Many centres appear to have encouraged their candidates to tackle 'How Science Works' questions during the course and they performed well in response to the Resources provided. Some centres might spend more time encouraging their candidates to think through the implications of resource material presented to them.

The mechanics of marking

Most teachers marked in red. Equally, many used the convention of one tick representing one mark. In some of the longer answers extra ticks were used and this does not make for clarity. It is not particularly helpful when the total is ringed under the question, instead of the mark being written in the margin as requested.

The term 'valid' is still in extensive use by some markers. It should be used rarely and, when it is used, it should be accompanied by some note of explanation as to how the alternative answer relates to the answers in the Marking Guidelines. Particular care should be taken not to use it when giving credit to a part answer.

The internal moderation carried out by some centres was clearly displayed on the scripts. In many cases this was a helpful exercise and annotations showed changes in marks. In just a few cases the 'second' marker made changes which wrongly disadvantaged the candidates.

Most of the paperwork was completed in an efficient manner, with all details correctly noted. Some ISAs did not display the name of the teacher who marked it which would be very helpful if more than one teacher is involved and standards vary. Candidate record forms were mostly completed efficiently.

The statistical test sheet has to be supplied to each candidate. Some centres included copies of this in the work they sent for moderation. This is perfectly acceptable but other centres saved postage by leaving them out. Clean copies may be stored and reused by future candidates.