



General Certificate of Education

Human Biology 1406

**HBI3T Investigative Skills Assignment
(ISA)**

Report on the Examination

2010 examination - June series

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General Comments

The 'new' specification has run for two years now, so as the second moderation phase came round there was an expectation of improvement. This was certainly the case in many centres where candidates dealt more effectively with the questions, and where the standard of marking was much clearer, and closer to the Marking Guidelines. Sadly, this was not the case everywhere, and there were still centres who failed to follow the guidelines or use the conventional strategies. Two ISAs were available, providing two very different investigations.

Both the AS ISAs were attempted in roughly equal amounts. It was pleasing to see that rather more centres had chosen to offer their candidates the chance to attempt both ISAs, and then pick the best mark. Centres who find the time to do this are to be commended for giving their candidates the very best chance to show their skills. Centres continued to use the Assessment Advisory service, available by phone or email for any practical concerns. This service is available to many more centres than actually use it; details are available from AQA Manchester.

Many teachers marked their papers with a great deal of care. They had clearly read the Marking Guidelines very carefully, and approached the task in a thoughtful manner. Annotations were added which helped the Moderator see where marginal decisions had been made. There are still centres that appear to pay scant regard to the Marking Guidelines, sometimes part answers were given full credit, and on other occasions answers which were not on the Marking Guidelines were given credit.

Stage 1

Most of the tables showing raw data were laid out competently, and by far the majority had the independent variable in the first column. If titles to describe the variable were inadequate the table title was used to give credit, but it would be better to see full titles at the top of each column. Only very rarely were units presented in the actual column. The recording of 'time' was again an issue, but many more candidates had chosen their units carefully. A few were rather casual in their approach to the recording of concentration.

It would appear that time was not an issue in centres when candidates ran repeats. There was considerable variation in the amount of time taken to run the osmosis investigation but all appeared to give suitable results. Some of the breathing rate results were surprising, with some extremely high rates being recorded. It is hard to believe that someone could breathe at 48 breaths per minute for any length of time, if at all. Candidates with surprising results were not penalised.

In a few centres, all the tables were very similar in layout. Rehearsing Stage 1 is not acceptable.

All centres attached the table to the ISA in the required manner. It is difficult to handle work during moderation which is just a heap of loose sheets. Centres are requested not to put the work of each individual into a separate plastic file; it is very time consuming to get them out and put them back. Staples and perhaps a communal cardboard folder are most acceptable.

Stage 2

The calculation of a mean appears to have improved since last year.

Once again the standard of graph drawing was variable, mostly from centre to centre. Many candidates produced excellent graphs showing the change in mass during the 'water potential' investigation. These graphs showed gains and losses of mass. A few candidates omitted minus signs. Graphs were generally drawn very neatly, with the use of a sharp pencil and a ruler being widespread. A few candidates unconventionally did not draw the y axis through zero on the x axis. Percentages were calculated by most candidates, and were displayed in a suitable manner, usually as an extra column on the table.

The biggest problem was caused by the scale, order, and x-axis labels on the 'breathing rate' work. Many candidates added a figure to their table for a volunteer at rest, but struggled to show it on the graph. Weak candidates joined line graphs onto 'resting rate', and labelled the variable 'intensity of exercise'. Some chose to plot the interval between standing and sitting, but used the values in reverse. This was correctly penalised by some centres, others erroneously gave such work full credit.

It was pleasing to see that most centres had taken care to check the accuracy of the plotting on both graphs. Very few mistakes were made. It was rare to find candidates using any other format than a line graph. It is very helpful when centres indicate which skills have been given marks on the graph and on the table. A series of ticks in a line or a column makes the decisions clear to follow.

HBI3T/P10: The effect of different concentrations of sodium chloride solution on the percentage change in mass of carrot tissue.**Question 1**

Most candidates knew that it was important to have the same water potential in all pieces of carrot; this was the most common answer.

Question 2

Some candidates took practical approaches relating to the space in the tube, or the time available to cut cylinders. A few good candidates made the subtle point that they needed sufficient mass to make a noticeable difference. This question was well marked.

Question 3

Many candidates appreciated the value of comparison, but references to 'proportional change' were rare. A large number of candidates recognised that the cylinders would vary in size despite their best efforts to cut them accurately.

Question 4

Sensible, practical answers were frequent, most of them related to temperature differences. Candidates often noted that this would affect the rate of osmosis but it was disappointing to see markers giving unwarranted credit for answers of a general nature which referred to rate of reaction.

Question 5

- (a) (i) Most candidates could draw a suitable line of best fit onto the axes, and a high proportion of those realised that a change in gradient was appropriate.
- (a) (ii) Graph reading skills were pleasing on the whole, and this question was well marked.
- (b) This question was well answered on the whole. Many candidates used the term 'isotonic'. A few weak candidates used the term water 'concentration' erroneously.
- (c) This question produced various answers, but weaker candidates were hampered by being unable to explain what they meant.
- (d) As answers were very much of the 'recall' type, this question was well answered and well marked. Competent candidates gained all the marks, weaker individuals do not appear to have prepared for the subject of 'osmosis'.
- (e) This was answered and marked well.

Question 6

- (a) Many candidates made a correct reference to haemoglobin.
- (b) This question required application of knowledge with understanding and was generally well answered. The term 'water potential' was used by many, but not by all. Most suggested that the cells would burst, but few commented on the loss of haemoglobin. It was good to see frequent use of the term 'osmosis' in answers.
- (c) (i) This question asked for further application of knowledge with understanding and proved to be more difficult for many. Few candidates were able to describe the effects of a smaller gradient and translate it into fewer cells bursting, as a result of less water entering cells. Some markers did not readily appreciate this difference.
- (c) (ii) This end stage was well answered and marked.
- (d) Many candidates gave the correct numerical answer, but struggled to give their reasons.

Question 7

- (a) This calculation was within the scope of most candidates, and was marked correctly.

- (b) Most candidates correctly recognised 'yeast extract' as the food type containing most salt.

Question 8

- (a) There was a wide range of answers offered here and, encouragingly, hardly any offered 'fair test'. Factors were chosen well, but explanations did not always follow, especially from weaker candidates. Some markers were inclined to agree to other unlisted factors.
- (b) A diet high in salt is known to cause a higher death rate but weaker candidates did not describe the evidence.

Question 9

Most candidates knew that salt is lost in sweat, but it was rare to see an answer that referred to water potential changes.

HBI3T/Q10: The effect of the intensity of exercise on breathing rate

Question 1

Most candidates recognised that there would be an effect on breathing rate if posture was changed. Weak candidates made reference to heart rate by mistake. Answers referring to tiredness were not seen during moderation.

Question 2

Apart from a minority who reverted to heart rate, many answered correctly. A few took wild guesses with no explanation. Some markers failed to credit 'return to normal' as a separate marking point.

Question 3

- (a) Candidates know to refer to anomalies in the context of running repeats but many still think that repeating reduces anomalies, rather than allowing them to be recognised; this problem is still apparent at A2. A lot of answers included reference to the mean and centres should encourage candidates to use this term in preference to 'average'. The term 'mean' was given credit in this examination.
- (b) Some reference was made to the possibility of fatigue, but it was necessary to refer to the fact that it could affect breathing rate in order to gain credit. Insufficient time was often referred to in general terms.

Question 4

These two answers were reversed by some candidates. For Group **A**, many appreciated that the rate could change over one minute, and that it was difficult to count this perfectly. Weaker candidates gave this in response to the shorter time of recording in Group **B**. For Group **B**, those who recognised that an error in a twenty second count could be multiplied up when converted to one minute struggled to explain what they meant. Some used numerical examples which helped them gain the mark.

Question 5

- (a) The calculation was well done by many. A few candidates could not attempt it. A similarly small number picked the correct figures off the graph, but could not manipulate them correctly.
- (b) There were plenty of suggestions made for the standardisation of the group of people. Most commonly 'fitness', 'smoker, or not', 'sex', or 'age' were offered. References to 'size' were not acceptable, but were given credit by some markers. 'BMI' was not noted during moderation. The 'state of health' list was extended as appropriate. Many candidates gained all three marks here.

Question 6

- (a) This question was frequently marked too generously. Weak answers did refer to the removal of carbon dioxide, or the supply of oxygen but in order to gain credit they had to

show an understanding of an increase in excess carbon dioxide, or supply of oxygen. Some markers gave credit here when this idea was not in the answer.

- (b) This piece of recall was well done by many candidates of all abilities. They made sound references to the change in the blood, where it was detected, and how the body responded. The erroneous term 'signal' was only encountered occasionally. The nerves were often named, and the role of the muscles was included. This question was confidently and correctly marked by most centres.

Question 7

Most candidates offered the correct response to this changed situation.

Question 8

Some candidates are inclined to offer answers they have learned by rote in preparation for previous examinations. These were rightly ignored by markers. Meeting a new piece of equipment gave candidates the opportunity to be creative with their responses, and many were able to suggest the advantages of using a stethograph. Some candidates gave the same idea expressed in two different ways; markers need to guard against giving excessive credit for this approach.

Question 9

- (a) Graph reading skills are generally sound, and this question was well marked when the answer was correct. A slight extension to the acceptable range was made at standardisation to take into account a regrettable change in the graph at publication. A few centres could have been more generous when candidates did recognise, and mark a straight part of the graph. Some only did this by putting marks on the graph itself, and some markers failed to check the resources or give the credit.
- (b) This question was answered correctly by many candidates, again showing sound graph reading skills.

Question 10

- (a) All the information for this answer was presented in the resource and many candidates took full advantage. It was disappointing to see that a large number of candidates satisfied themselves with answers referring to the timing of the rise, but not to the level at which it took place.
- (b) The explanation of what is conveyed by the standard deviation was either very well known, or subjected to what can only be described as guesses. Answers which referred to the 'spread' of the data were creditworthy, but only if they made reference to the mean.
- (c) This was answered with confidence; the group was correctly recognised, and suitable reasons frequently offered.

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- (d) Some candidates gave the impression that there was no breathing when exercise was not being taken. Disappointingly, many markers were very generous with this question, and marks were given for part answers or for mixed responses.

Question 11

- (a) Another graph reading exercise should have been answered with a similar level of competence to that seen in question 10. This was not the case. Candidates were frequently careless with their references to the point at which the rise started; they did not state that before that level the line was constant and they did not point out that it rose beyond that point. Some marking was casual in this context.
- (b) Marking in some centres was similarly casual in this part. It was important to refer to the speed in order to gain credit, even if only in 'lower' or 'higher' terms. The type of respiration had to be identified in three of the alternatives. Many candidates only gave part answers, using recall rather than linking their thoughts to the presented situation. Disappointingly, such answers were often given full marks.

Question 12

The most common responses related to the oxygen debt which had to be repaid. Very few candidates made any reference to the production of lactate, or to its removal.

General comments

Some centres have clearly improved the standards of their candidates with respect to carrying out practical work, recording and displaying data, and answering questions. There was still a disappointingly large number who did not recognise the need for a linear, ascending scale on the x-axis of their graph.

Most candidates gained a larger number of marks in section A than in Section B, where they were responding to unfamiliar resource material. Some weaker candidates gained no marks in the second section. The same people were unable to explain ideas which could have been requested on theory papers. It could be concluded that centres should not underestimate the amount of exposure to data candidates need in order to improve this part of their work. Candidates should be prepared to think about the scenarios being used, and try to imagine what is happening before they answer the question.

The mechanics of marking

Most teachers marked in red. The majority awarded one tick per mark, and went on to record sub-totals in the margin. A few confused the issue by putting a tick per idea rather than per mark. Bonus ticks were also sometimes included.

Annotations are always welcome, and many markers use them. They should, however, guard against interpreting the work of the candidate in order to give them the mark. Notes on marginal decisions are particularly helpful. The term 'valid' was used, but less frequently than before. When it is used it is often by an answer which is disallowed after standardisation.

Internal moderation was evident in the work from some centres. In one or two cases this served to take away marks which had been legitimately earned; some discussion may be needed after internal checks have been made.

The Candidate Record Forms were well completed on the whole, and sent with the scripts. Most contained all the mandatory numerical information and the signatures. Occasional explanatory notes were helpful. Some teachers failed to sign the front of the actual ISA. Very few failed to turn the sheet over and complete the back.

Overall, it appeared that more centres had taken the trouble to carry out the marking in a suitable manner, and after careful consultation of the Marking Guidelines. Sadly, a few ignored this document, and the marks awarded to their candidates were out of tolerance.