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ASSESSMENT and QUALIFICATIONS ALLIANCE

## General Certificate of Education

# Biology 1411

## BIO3T Investigative Skills Assignment (ISA)

# Report on the Examination

*2009 examination - June series*

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## General Comments

Most centres implemented the ISA investigations suitably and marked their candidates' scripts in accordance with the Marking Guidelines. It was very pleasing to see how well centres had achieved this. Their efforts were much appreciated by the team of moderators. Centres are reminded that it is essential for the method to be trialled in the centre before the ISA practical is implemented to ensure that the materials to be used give suitable data.

ISA P was submitted by many more centres than ISA Q. Very often all the marks submitted by a centre were only from ISA P, suggesting that many centres had only attempted one ISA. Usually when ISA Q marks were submitted, there were marks for ISA P scripts as well. ISA Q was often more generously assessed by centres than ISA P.

Marking was reasonably accurate and usually within tolerance. However, centre marking did vary enormously, from being exactly in line with the moderator to being considerably lenient so that a large adjustment was applied. A few centres were slightly too strict in their application of the guidelines.

The most common reasons for mark adjustments were centres awarding the mark when the answer given was of a lower standard than that required in the Marking Guidelines or centres awarding the mark when the point in the Marking Guidelines had not been fully made. Some centres also rewarded a large number of answers that were not specified in the Marking Guidelines. Although these marks were usually awarded for biologically correct statements, these statements were frequently not valid answers to the questions set.

Where there was a difficulty with administration, it was usually as a result of centres forgetting to send a centre declaration sheet with their work, or, occasionally, forgetting to include a mark for the PSA in the total mark reported.

Many centres missed candidate numbers from the ISA and some had the wrong candidate number. Centres are reminded that the centre number and candidate number should be written on every piece of paper, including the table of results and the graph. It is helpful if all the work for a particular candidate is secured with a treasury tag or a staple; the use of plastic pockets is not recommended.

***Guidance for Teachers Marking ISAs*** is published in the Teacher Resource Bank on the AQA Website. Many centres did not follow these guidelines in relation to the mechanics of marking, particularly in relation to the requirement of 'one tick = one mark'. The placing of ticks did not always make it clear why the mark had been awarded. Some centres did not place any ticks on the work, whereas others failed to include subtotals for the various sections of the questions. This made the moderation process difficult. It is helpful if a tick is placed in red ink on the script at the point at which the mark is awarded, and the total for that section is written in the margin.

It was pleasing to see clear evidence of internal standardisation on many scripts; unfortunately on some it was difficult to decide which marks were the final ones used. Internal standardation should be carried out by marking in a second colour or pencil, making it clear to the moderator which marks have been finally awarded by amending the red ticks and numbers to the agreed mark.

A few centres made errors in addition and in the transfer of marks.

PSA: It was pleasing to see a range of marks sumbitted for the PSA by the vast majority of centres.

**STAGE 1**

Marking of the tables was usually accurate. A few centres gave credit when full descriptions of the independent and dependent variable were not present, or when units were present in the body of the table. Candidates should record the value of 'room temperature' in their tables and on the x-axis of their graphs. Centres are reminded that it is the table that is completed when the data are collected during the first practical session that should be assessed.

**STAGE 2**

Graphs were usually well marked. However some centres failed to penalise scaling errors, missed units, inappropriate extrapolation and lines drawn which ignored some of the plotted data.

The main candidate errors in ISA P were failing to calculate rate, incorrect rate units and incorrect scaling when room temperature was not 20 ºC. The main error in ISA Q was failing to differentiate between rise and fall of the drop. In both ISAs, ignoring some of the plotted values in drawing the curve, and extrapolation were common errors.

## ISA P

### *Question 1*

This was well answered by the majority of candidates.

### *Question 2*

Candidates often gave answers which were incomplete. They recognised the purpose of a water bath in bringing the two solutions to the same temperature, but omitted to explain what that temperature would be. As solutions which had been standing in the laboratory for a period of time would both have the same temperature as that of the room, mentioning 'same temperature' was insufficient. A reference either to equilibration or to the same temperature as the water bath was required. Centres tended to be over-generous in their interpretation of this point. Most candidates did, however, score a mark here.

### *Question 3*

This was usually answered correctly by candidates. Some centres incorrectly credited 'No' as a valid answer to the question.

### *Question 4*

The first mark was for describing what was done and the second mark was for explaining the reason why it was done. Many centres incorrectly awarded two marks for a description by taking the first point from each of the pairs of alternatives in the Marking Guidelines. The expectation was that candidates would recognise that, as temperature varies over time, they need to record it several times during their investigation. Some centres incorrectly awarded the mark when the temperature had only been recorded once. Most candidates scored at least one mark.

### *Question 5*

There were many lower level answers than the one in the Marking Guidelines, such as 'to get reliable results' or 'to improve reliability'. Some centres incorrectly credited these candidates with a mark rather than requiring reference to a 'reliable mean' as indicated in the marking guidelines.

### *Question 6*

Many candidates clearly understood what the control was used for, but were let down by poor expression or did not relate their answer to the specific investigation. Weaker candidates tended to misinterpret the question and just stated that the solution would remain cloudy.

### *Question 7*

(a) Answers to this question were often centre-specific. Some were universally excellent but, in others, few candidates gained credit. It was sometimes to tell which marking points had been given on some scripts and, on others, marking points were awarded twice. It is recommended in questions of this nature, with a large number of marking Points, that the ticks are numbered as in the Marking Guidelines.

Some centres gave credit for descriptions when the marking points required an explanation. Credit was given when the point had not been completely made, e.g., reference to a change in the active site with no mention of shape should not have awarded a mark. Some also incorrectly credited 'no reaction/no enzyme-substrate complexes formed' at 60 ºC, and also awarded a mark for any reference to bonds, rather than to 'hydrogen bonds' as stated in the Marking Guidelines.

(b) This was usually correctly answered by candidates.

### *Question 8*

Many candidates mentioned the use of a colorimeter but only a minority were able to gain the second mark. More candidates scored two marks with the second alternative answer. Many candidates described the investigation they had just carried out.

### *Question 9*

This was well-answered by the majority of candidates. Some centres incorrectly credited 'excretion' as an alternative to 'not absorbed'. 'Absorbed into tissues' was credited as a valid answer.

### *Question 10*

In this question, the idea of total volume of blood was required in order for a mark to be awarded. Some centres missed this and awarded a mark when this key aspect was not present. Only a minority of candidates scored a mark here.

### *Question 11*

This question was well answered by the majority of candidates. Most were able to answer suitably in terms of a random allocation of patients to one or other group, or the control of a specified feature in each of the two groups.

### *Question 12*

The majority of candidates answered in terms of placebos or their equivalent, usually explaining their use in terms of eliminating psychological effects. Many candidates stated that the control group should be 'given nothing' or 'not given bromelain', and some centres incorrectly credited this. Some candidates also stated that alternative pain killer should be given.

***Question 13***

This was usually correctly answered by candidates and was well marked.

***Question 14***

Most candidates scored two marks here, usually for small sample size and variation in perception of pain. Other valid points, such as variation in healing rate, were credited for this question. The question was generally well marked, but some centres gave credit for generic answers. In questions involving data from scientific work, it must be assumed that the scientists carried their investigation correctly unless there is evidence to the contrary. Answers should be based on the data provided rather than assumptions of what might have been the case.

***Question 15***

Candidates found this difficult; those who gained credit tended to do so for referring to the same rate of respiration as at the start. There were many vague references to fair tests.

***Question 16***

This was a demanding question which was poorly-answered by the majority of candidates – many concentrating on the very small rise in the curve as the most significant aspect of the data. Many centres gave two marks for a description of the curve, rather than separating the two marking points as in the Marking Guidelines.

***Question 17***

As in Question 14, candidates should be encouraged to use the data provided and not give generic points. Most candidates scored two marks, usually for reference to use of mouse cells and one type of cancer. Few made any mention of the *in vitro* issue. Centres sometimes gave credit for general responses which were not appropriate in the context of this question. For example, marks should not have been awarded for 'lack of repeats' for 'lack of peer review' or for 'journalists or scientists being biased'. Candidates should be advised to give only the required number of answers as additional answers which are clearly incorrect can cause marks already gained to be cancelled, using the "list rule". If two valid points are made in one of the answer spaces, both should be credited.

***Question 18***

Many candidates did not link their answers directly to cell division, i.e. tumour growth, as required in the question, and discussed the spread of cancer instead. Some centres incorrectly credited answers along these lines.

***Question 19***

This question focused on the ethical aspects of the investigation. Relatively few candidates were able to give suitable complete responses. Most candidates were, however, able to score one mark, usually for reference to the life of the patient being at risk.

## ISA Q

### *Question 1*

Most candidates scored the first mark, but few mentioned the advantage of having a large change in density. Many centres credited 'enough time for osmosis', even though this was an incomplete answer according to the Marking Guidelines.

### *Question 2*

Most candidates had the idea of evaporation but few went on to explain that loss of water from the cells would change their water potential. This question was well marked by centres.

### *Question 3*

Many candidates gave generic answers about why three or four repeats are normally carried out. In this question, candidates had to justify why they carried out a specific number of repeats by 'using their data', for any marks to be awarded.

### *Question 4*

Usually well done by candidates and well marked by centres. Centres sometimes awarded this mark when the candidate's data table did not support the answer given. A reason involving the greatest range or variation in data used to calculate the mean was expected.

### *Question 5*

(a) Few candidates gained credit for this question. Where marks were obtained it was usually for the last marking point about zero rate change at 0.25 mol $dm^{-3}$. Most candidates did not answer in terms of rate changes, and failed to note the decrease to zero followed by an increase. Many centres awarded a mark for an incomplete answer which just referred to an increase in rate.

(b) Usually at least one mark was achieved, and occasionally all three were scored. Centres are urged to use the convention of placing a tick at the point on the script where the mark is awarded, and to write the number of the marking point awarded alongside that tick. This makes both the process of checking and that of moderation easier. Moderators found that the same marking point was sometimes credited twice for one candidate and an incorrect range was given credit. A significant number of centres awarded the third marking point without the term 'osmosis'. There was also a disappointing tendency for answers to be awarded high marks in which the science used (e.g., the direction of water movement) was incorrect.

***Question 6***

Most candidates scored at least one mark for correctly reading the graph, but clear explanations were rare. The question was usually well marked, but a missing minus sign or missing units were not always penalised by centres.

***Question 7***

Many candidates were able to give good answers about the difficulties they encountered. Density changes due addition of the dye and difficulty in controlling the force with which drop was released were accepted as valid alternatives.

***Question 8***

(a) This was well done by the majority of candidates.

(b) This was mostly well-answered, but some candidates did not realise that a correlation does not infer a causal relationship.

***Question 9***

Relatively few candidates were able to give suitable responses, but the question was well marked by centres. Making a comparison with the existing treatment was accepted as a valid alternative.

***Question 10***

This was well marked, although only a minority of candidates mentioned the need for alternative treatment, most of them relating their answer to fair testing.

***Question 11***

This was usually correctly marked with most candidates recognising the concept of bias. It was often incorrectly marked when candidates discussed reliability.

***Question 12***

This was well marked, although only a minority of candidates scored the second mark.

***Question 13***

(a) Only a minority of candidates showed an understanding of standard deviation. Other answers, such as that there was less variation in the change in body mass with the ORS than with porridge, were also accepted.

(b) In this question it was essential that answers did not apply to the whole group, but only to 'some children'. This difference was not always recognised by candidates or, indeed, by centres marking the work.

### *Question 14*

(a) The majority of candidates scored two marks.

(b) Many candidates also scored these two marks as well. Both parts of the question were well marked by centres.

### *Question 15*

Candidates found it relatively straightforward to compare the two treatments, but more difficult to support their answer with data selected from the resources provided. Many candidates scored two marks, usually for the first two marking points. Most centres correctly accepted 'reduced faecal output' as a valid alternative to the marking point concerned with change in body mass.

### *Question 16*

Knowledge of cholera was generally poor and only a minority of candidates scored two marks. In this question, some centres again accepted lower level answers than those in the Marking Guidelines, e.g., reference to 'chloride' ions was required for the first marking point and a reference to 'osmosis' was required for the third marking point.