BIO3T

Administration

Schools and colleges are reminded to refer to the Instructions for the Administration of the ISA, published on the AQA website in Teaching and learning resources http://www.aqa.org.uk/subjects/science/a-level/biology-2410/teaching-and-learning-resources for guidance on how to conduct and also to maintain the confidentiality and integrity of the ISA assessments.

Most schools and colleges had worked extremely hard to ensure that the required sample of work and the accompanying documentation arrived with the moderator in good time. This was much appreciated.

As last year, significant errors involving the addition and transfer of marks were found by the moderating team. Moderation is based on a sample of work, so errors involving the work of other students could go unnoticed to the disadvantage of some. If not already in place, schools and colleges are strongly advised to establish a system of checks to prevent errors of this nature. These checks should also include ensuring that a student’s name and candidate number appear on each part of the ISA and on any additional sheets. Component parts or sheets can easily be separated during the moderating procedure and, without a means of identification, are extremely difficult to relocate.

The mechanics of marking

Moderators try to support the marking of a school or college. Marks are only changed when what is rewarded fails to meet the requirements of the Marking Guidelines. It is much easier to support marking when the instructions in the Guidelines for Teachers marking Biology ISAs have been followed as required. Assessors are reminded that this section should be read before any work is marked. The following points should be noted.

• Work should only be marked in red ink. Blue, black and green ink pen, as well as pencil, were all used and often resulted in ticks being very difficult to distinguish from the student's own writing. In some cases, where more than one colour was used, it was not always clear which ticks or marks contributed to the overall mark.

• For each mark awarded, a tick should be placed on the work as near as possible to the point awarded. In all cases, a tick should represent a single mark. The total number of marks for each part answer should be written in the right hand margin. The practice of ringing the mark allocation leads to difficulties in interpretation.

• Marking points awarded for tables and graphs must be clearly identified. The simplest approach is to indicate each marking point with either a tick or a cross in a column or in a row at the side of the table or graph.

• Schools and colleges are requested to show the marking point number alongside the tick. This proves helpful both to the assessor - ensuring that the same marking point is not awarded more than once - and to the moderator who is then able to understand which marking point is being awarded and better appreciate a school's or college’s application of the Marking Guidelines.
• The work submitted by many schools and colleges showed evidence of internal standardisation. This process is essential but it must be clear where dual marking has taken place, which set of marks have been accepted as final. In all cases, the agreed marks should be shown in red.

Applying the Marking Guidelines

Where marking fell outside AQA’s tolerance limits, differences between the marks awarded by the school or college and those given by the moderator often resulted from a failure to apply the general principles of marking outlined in the initial Guidelines for Teachers marking Biology ISAs or a failure to apply the Marking Guidelines with sufficient rigour. Schools and colleges should note the following points in particular.

• The guidelines are presented in two columns. The first is headed Marking Guidance and the other is headed Comments. Both must be considered in determining whether a mark should be awarded or withheld. Many moderators reported that mandatory points made in the Comments column were not always considered in marking the work.

• The points made in the Marking Guidance represent the minimum acceptable answer. More detailed answers should clearly gain credit but those in which the detail is less than that stipulated should not be given credit. For example, in ISA P, question 10, the marking point stipulates “Enzyme hydrolyses/breaks down protein to amino acids.” A response, such as “The protein is broken down into smaller proteins”, should not gain credit as it does not identify amino acids (as the soluble products of protein digestion).

• Some marking points need more than one aspect to be included before the mark can be awarded. Thus the Marking Guidance for ISA P required students in question 7 (a) to “Describe …differences (between people).” A mark can only be awarded if an appropriate difference is given. A reference to one person only should not gain credit.

ISA P - The effect of pH on the time taken by amylase to hydrolyse starch

Stage 1

Tables were generally of a very high standard, with most students being clearly familiar with the conventions that should be adopted in constructing a table. The independent variable required something more than just ‘pH’, as shown in the Comments column, but where only this was given, some teachers, erroneously, did not withhold credit.

Stage 2

The standard of graph drawing in this ISA was generally high. Lower scoring students plotted time taken rather than rate or produced a non-linear scale on the x axis. The pH 6.4 value proved to be the troublesome plotting point and a few assessors did not recognise a scale error or plotting inaccuracy when assessing the graph.
Written test: Section A

Question 1

Few students had difficulty with the opening question, mostly making appropriate reference to finding the optimum pH within the range or denaturation of the enzyme outside of the range.

Question 2

Lower scoring students did not identify the increase in kinetic energy and some assessors also incorrectly rewarded just a reference to energy or to just the idea of more collisions without the required qualification.

Question 3

There were different acceptable approaches for this question but the majority of students gained credit for comparing the colour of the solution with that of iodine.

Question 4

Schools and colleges correctly disregarded any suggestions that related to human error. All the possible alternatives were seen across the cohort.

Question 5

(a) This question evoked some excellent responses showing a sound understanding of the principles underlying the effect of pH on enzymes. There was no credit for discussing what might happen outside of the pH values quoted. Fewer students were able to explain a change in charge compared with those who could explain the change in shape. Both of these aspects related to an effect on the enzyme so it was not appropriate to reward references to hydrogen ions (in solution) as a change in charge (on the enzyme).

(b) A high proportion of students appreciated that straight lines are drawn where intermediate values are not known.

Question 6

(a) Almost all students correctly identified maltose as the disaccharide released on hydrolysis of starch.

(b) This question was an example of where credit was sometimes given when both aspects of an answer were not evident as well as a failure to take account of mandatory information provided in the Comments column. Thus, unless Benedict’s reagent was shown to be heated, marking point 1 should not have been awarded.

Written test: Section B

Question 7

(a) The first part of this question required the description of differences. Many students were able to identify two appropriate differences but it was also the case that the Marking Guidelines were not always applied as given, in particular, where only one statement was made and no difference shown.
(b) A common weakness with answers to this question was a failure to identify the location of where little or no amylase would reach and less starch digestion would occur as a result of a blocked pancreatic duct. Only a few students considered that salivary amylase would not be affected.

**Question 8**

Many students identified the specific nature of amylase but did not always explain that there would be no harmful effects because the substrate for amylase (starch) was not found in blood.

**Question 9**

In this question, students were frequently able to suggest that body proteins would be digested but were less able to offer a suitable example of a protein. It was common to see a hopeful reference to “blood cells” without a specific identification of (cell) membrane proteins or other blood proteins, such as antibodies, that would have gained credit. Occasionally, assessors allowed protein examples that would not be part of the blood and therefore not answering the question asked.

**Question 10**

There was some weakness with both the answers to this question and the assessment of what was written. As mentioned before, marking points show the minimum required answer and marking point 1 clearly identified that amino acids would be formed. It was disappointing that quite a few assessors felt that “smaller proteins are formed” or simply that “proteins are digested” was sufficient to award this marking point.

**Question 11**

In the main, students used the information provided well to answer this question. The majority referred to trusted ideas such as the limited number of stains used or that there was only a single set of results. Higher scoring students used the more sophisticated arguments, such as not including results where there was no change, and made specific reference to the actual stains.

**Question 12**

It was also the case that many students answered this question well, particularly where appropriate temperatures were identified to support the use of enzyme $S$ or to explain why enzyme $P$ was inappropriate for use. However, the general idea, that enzyme $S$ was effective across a wider range of temperatures, was often not recognised.

**Question 13**

Many students finished with full credit in this question. In weaker answers, as was often the case with many questions, students failed to translate the idea in the question first. Thus, ‘a wider range of stains’ was not explained as caused by different substances being present but this did not prevent most being able to identify that the specific nature of enzymes was due to their active site.
ISA Q – Estimating the density of stomata in the lower epidermis of leaves

Stage 1

Tables were almost always of a high standard, with students gaining full credit. There was an occasional allowance of an incomplete description of the dependent variable despite the statement in the Comments column.

Stage 2

Overall, there were few problems with the calculations and plotting of the bar chart. A few students created their own problems because of the practice of considering certain values to be “anomalies” – an issue that persists – and then discounting them from their calculation. Students should appreciate that the grounds for identifying so-called anomalies are often flawed. Carrying out an investigation three times is not sufficient to identify anomalies. Variation is inherent in biological investigations and is usually a much more plausible explanation of a range in values than considering certain values to be anomalies.

The bar chart requirements to produce non-touching bars of equal width were seen consistently. Any failure to gain credit was usually associated with the inaccurate plotting of bar heights and, particularly, with plotting the upper and lower position of the standard deviation bars.

Written test: Section A

Question 1

There were many sound answers to this question, with students either identifying that leaves from the same plants would be genetically identical or would have experienced the same growing conditions.

Question 2

Many students appreciated that a sufficient number of counts would be required to enable the production of a mean that was representative. It was not appropriate to suggest that with sufficient counts, so-called ‘anomalies’ could be ignored.

Question 3

Almost all students could explain how to obtain the magnification used as the product of the values for the eyepiece and objective lenses.

Question 4

There were various possible approaches to answer this question. Students generally referred to the use of a tally chart, the need to repeat a count or the inclusion (or exclusion) of stomata that were only partly within the field of view.

Question 5

Few students expressed the idea that the distribution of stomata may not be the same throughout the leaf and, hence, why it was important to use different fields of view. Many just repeated the idea of enabling the calculation of a mean – which some assessors incorrectly allowed - rather than producing a result that was representative of the leaf as a whole.
Question 6

The Marking Guidelines specified that to get both marks firstly, a statement that compares means and, secondly, a statement that uses standard deviations was required. Unfortunately, some students were awarded full credit where this was not the case.

Question 7

(a) Two ways for determining the area of the field of view were allowed. Whilst counting the number of squares that were covered on a piece of graph paper was seen, the majority gained credit from measuring the radius and using $\pi r^2$.

(b) Students were a little less convincing with their descriptions of how to estimate the total number of stomata in the lower epidermis of one leaf. There was generally a lack of detail of how to measure leaf area or recognition that the mean number of stomata per field of view should be applied. This latter point was attributed by some assessors without such qualification, showing a lack of rigour when applying some Marking Guidelines.

Question 8

Most students appreciated that with fewer stomata there would be less transpiration or evaporation in xerophytes, but rather fewer identified this feature as an adaptation to existence in areas where water is scarce.

Written test: Section B

Question 9

Invariably, students could offer three appropriate environmental variables that scientists would have controlled. Some assessors credited what they considered valid, as a general reaction to control of variables, without considering the conditions that would apply as outlined in the resource materials with seeds sown in trays and kept in controlled conditions. Students who failed to achieve full credit were usually guilty of producing a stereotyped response.

Question 10

This question troubled many, but the higher scoring students recognised that the curve had already levelled out and, in effect, it would serve no purpose to continue at higher temperatures.

Question 11

Many students chose the wrong reasoning considering the growing conditions to be the relevant factor as opposed to potential differences in the number of stomata at different stages of leaf development.

Question 12

In marking point 1, ‘kinetic’ was underlined. This means that use of the term is essential before the marking point can be awarded. Students often identified the effect of a temperature increase on evaporation rate but few expressed this in terms of diffusion rate. As a consequence, most students failed to gain marking point 3.
Question 13

In general, students made good use of the data, as required, answering this question. Weaker answers only identified the overall trend.

Question 14

There was some misinterpretation of this question by students. All that was required was a description of what standard deviation shows, namely, the variation in, or spread of data about, the mean value. Some attempted to discuss standard deviation values related to the data obtained but, unlike in question 13, there was no specific direction to do so in this case.

Question 15

Given that two possible approaches to this question were possible, the majority of students were able to make one acceptable line of reasoning.

Question 16

The link between carbon dioxide and photosynthesis was not apparent to a large number of students. Thus, they failed to gain the mark for this question.

Question 17

Although all responses were seen within the work that was moderated, most students could not make three relevant points – the mark allocation was the key for this – to justify whether the results supported the conclusion. It was rare to see recognition of a negative correlation, although some described such but were only repeating the question stem and, for doing so, there is no credit. This type of question reflects a weakness with the assimilation of resource material. The likelihood of another factor being responsible was the most common point made, but this supports the idea that many students produce rehearsed answers without showing a comprehension of what is in the resources.

Question 18

Many students finished strongly with a question relying on recall. The Marking Guidelines specifically referred to “thick” cuticle but some assessors credited reference to ‘waxy’ as an alternative.
Mark Ranges and Award of Grades

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

Converting Marks into UMS marks

Convert raw marks into Uniform Mark Scale (UMS) marks by using the link below.

UMS conversion calculator