General comments

At this level of assessment, schools and colleges will have already received feedback on the standard of their marking at AS, have had opportunity to read previous Reports on the Examination and become more experienced with the marking of ISAs. Although moderators reported that it was pleasing to see that a high proportion of centres were assessing students at the correct level, they also reported that some were not. To maintain standards, please ensure that all of the following advice and identification of aspects which could be improved are heeded.

Administration

Schools and colleges are reminded to refer to the *Instructions for the Administration of the ISA*, published on the AQA website in the Teaching and learning resources web page (http://filestore.aqa.org.uk/subjects/AQA-2410-W-TRB-ISAADMIN.PDF) 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 very much appreciated.

As last year, some significant errors involving the addition and transfer of marks were found by the moderating team. 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 appears 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. Checks should also verify that there is both a teacher and candidate signature to authenticate the assessed work.

There was some excellent evidence of internal standardisation. This usually resulted in the better overall judgement of an individual piece of work as well as an overall standard of assessment that was close to or matched that which is required and expected.

The mechanics of marking

Moderators do their upmost 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. Marking in blue, black and green ink, as well as pencil, were all seen. Where a different colour has been used for internal standardisation, the final agreed mark should be shown in red. It was not always clear which ticks or marks contributed to the final 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 or crossing through 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 reminded 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.

Applying the Marking Guidelines

Where marking fell outside AQA’s tolerance limits, differences between the marks awarded by a 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 Q, Question 6, the marking point stipulates “Different species have different shaped leaves”. A response, such as “Different plants have different sized leaves”, should not gain credit as it does not make clear that the leaves are from plants of different species and furthermore, size will vary at different stages of development within the same species, so it is shape and not size that should be identified.

- 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 11(a) to identify that organisms of the same species have the potential to breed together and produce fertile offspring. Without both aspects the mark could not be allowed but this was seen, albeit, infrequently. However, issues like these explain how moderators might begin to identify a school’s or college’s marking as not being within acceptable tolerance limits.
ISA P – Investigating reaction times

Stage 1

Question 1

Most students were able to apply the formula correctly to calculate reaction times, although a few did not use Trial 3 values as required.

Stage 2

Question 2

Nearly all students could produce a valid null hypothesis although a few who did not include reference to reaction time were allowed credit.

Question 3

The correct statistical test was selected by almost all students and the choice appropriately supported by a reference to a comparison of the two mean values of the samples.

Question 4

Calculations were generally accurate and presented methodically. There were some that were difficult to follow and did not make clear whether the results showed an overlap or not.

Question 5

Higher-scoring students correctly interpreted their calculations, but lower-scoring students showed some confusion by mixing up probability and chance and when to accept or reject their null hypothesis. A few used the phrase “at the 5% level of probability” rather than referring to probability as ‘less than’ or ‘greater than’ 5%. Some assessors also appeared to be equally uncertain about interpreting the test statistic.

Written test: Section A

Question 6

Almost all students appreciated that resting the arm on a work surface would ensure that only the hand moved.

Question 7

Most students answered this question with the ‘easier to catch’ response. A few referred to the amount of scale covered up.

Question 8

Most students appreciated the need to standardise the method and expressed this in a variety of ways.
Question 9

Students scored at least one mark; many students achieved full credit. The need to avoid knowing when the stick was to be dropped was appreciated by most. Recognising the consequential effect on reaction time allowed higher-scoring students to gain both marks.

Question 10

There were many approaches to this question and overall almost all marking points were seen as a response to this question, with many students gaining two marks.

Question 11

Most students appreciated that the first two trials were ‘like a practice’ and stated this as their answer.

Question 12

This question discriminated quite well. Nearly all students appreciated that reaction time would change with age. Responses concerning ethnic group and body size were variable with less clear answers referring to body shape (ethnicity) and amount of fat (body size). Many students were not aware that caffeine would affect reaction time and had difficulty in suggesting its effect.

Question 13

Most students understood that catching the measuring stick involved conscious thought and this was expressed in a variety of ways. The higher-scoring students went on to explain why this was not an automatic response.

Question 14

(a) Production of a graph is a requirement at AS level. Moderators were surprised that within a relatively short period of time, many students had forgotten basic principles and were not able to score full marks. Thus, the question discriminated better than expected. Better prepared students did score all four marks, but all manner of interpretations and line presentations were seen. Some lower-scoring students drew the graph with the reaction time increasing slowly then decreasing rapidly. A few drew a bar chart, and many failed to gain marks because they failed to put units on the x-axis. Pleasingly, very few students extrapolated the graph beyond the age range given but those who did, tended to extrapolate towards zero.

(b) Most students were successful with this question, appreciating that standard deviation measured the spread around the mean.
Written test: Section B

Question 15

Many students scored two or more marks on this question. The expression of some lower-scoring students suggested that ‘receptors’ or ‘cold’ travelled to the hypothalamus. Others wrongly referred to vasoconstriction of capillaries and this error was not always recognised by assessors despite a requirement to do so as indicated in the Comments. Some students confused vasoconstriction and vasodilation, while a few others discussed erection of hairs and shivering. This demonstrated that the question had not always been fully understood. Assessors rejected reference to ‘signals’, but some were willing to allow ‘impulses’ without qualification as either electrical impulses or nerve impulses as the marking point required.

Question 16

(a) Most students correctly stated that there would be slower diffusion, but only the higher-scoring students scored the second mark for ions. Some students referred to events at the synapse, which was not credited.

(b) The effect of myelination on transmission speed was well known, but the effect of axon diameter less so. Lower-scoring students suggested the factor to be the diameter or thickness of the axon membrane.

Question 17

This was answered well by many students. The Marking Guidelines caused a few problems for assessors who had difficulty with the position and meaning of the solidus.

Question 18

Overall, this question was answered well. Few candidates had difficulty with explaining how to find either the mode or the range.

Question 19

Many students calculated standard error, stated that the bars overlapped and so understood that the difference was not significant. Thus, they achieved all three marks. Quite a few students did not appreciate that confidence limits are found from twice the standard error.

Question 20

The most common responses were versions of marking points 1 and 2. Students who failed to score on this question did not make clear to which group of swimmers they were referring.

Question 21

Amongst the cohort, all marking points were seen. Many students scored three or four marks on this question showing a good appreciation of incomplete information provided by the investigation and the subjective nature of the statement.
ISA Q – Investigating populations

Stage 1

Question 1

Almost all students completed the calculations correctly.

Stage 2

Question 2

Most students were able to formulate an appropriate null hypothesis. Moderators reported that it remains the case that some assessors are less than clear about what constitutes a suitable null hypothesis. Weaker answers omitted to mention the direction the leaves faced.

Question 3

The correct statistical test was selected by almost all students and the choice appropriately supported by a reference to a comparison of the two mean values of the samples.

Question 4

Calculations were generally accurate and presented methodically. There were some that were difficult to follow and did not make clear whether the results showed an overlap or not.

Question 5

Many students interpreted the results of their calculations appropriately and expressed themselves clearly. To gain maximum credit there should have been a statement referring to the probability of the result being due to chance supported with a reference to the results of the calculation. There should have been a second statement explaining the consequences of this on acceptance or rejection of the null hypothesis. Answers that did not gain full credit usually confused probability and chance. Given the requirement that both of these terms be used in the answer, moderators could not support the few assessors who had awarded both marks when this was not the case.

Written test: Section A

Question 6

Many students were able to express correctly the idea that the same species of plant was used as the plants would be genetically similar. However, a significant number of students incorrectly believed that different plants would have different dimensions or different sizes of leaves, rather than different shapes of leaves.

Question 7

Most students appreciated that removal of the leaves would damage the plant and/or the habitat. Equally, they were aware that the leaf might decrease in size as a result of drying out or shrinking.
Question 8
Most students appreciated that the leaf needed to be flattened, as it would be difficult for maximum dimensions to be obtained otherwise.

Question 9
(a) Most students were able to identify the correct form of graph required. Lower-scoring students incorrectly chose a line graph and there were instances of incorrect graphs gaining credit. Greater difficulty was experienced when students had to provide reasons for their selection. Students had good understanding that the variables were both continuous, but it was rarely stated that the measurements were in pairs.

(b) Most students were able to explain correctly what was meant by the term ‘a positive correlation’. Students expressed this in both general terms, or by making reference to the named variables.

(c) Almost all students provided an appropriate null hypothesis, in a variety of ways, expressing the idea that there was no relationship or association between the length of a leaf and the mass of the leaf.

(d) Almost all students provided a suitable method for determining the mass of a square centimetre of leaf. Both approaches were employed. When students elected to determine the surface area of the leaf, the methods chosen were suitable and usually fully described.

(e) Most students correctly selected the appropriate statistical test.

Question 10
(a) Most students were able to express correctly the idea that the true size or true mean of the woodlouse population would be found within the bars. This was normally expressed as ‘the standard error will show how far above or below the mean the true value would be’. Some students failed to make any reference to the ‘bars’ or confidence limits in their response.

(b) This question was troublesome for many students. Few appreciated how to interpret the greater standard error value. Most students had an idea that this would indicate that there was greater variability in the sample, but some expressed this in terms of greater range of values. Equally, some students only referred to changes in the population of woodlice, rather than the change in the distribution of the woodlice.

(c) Most students had a good understanding of the principles of mark-release-recapture and were able to apply this to a human population study. They were fully aware that the population size could alter because of births and deaths occurring and also the possibility of people being unwilling to participate. Although aware of the effect of ‘migration’, unless they stated the terms, immigration or emigration, they failed to make it clear that the population would alter because people would either enter or leave town during the study. Many unnecessarily provided reasons why it would not be correct to mark people. Conversely some went into detail as to how people could be captured in order to mark them or how unethical ‘people traps’ would be.
Written test: Section B

Question 11

(a) Most students were able to provide a suitable definition of a species, incorporating both elements of the definition in their response. A limited number of students provided a response that was not related to either reproduction or offspring. These students made reference to the hierarchical system of classification.

(b) Most students were able to explain correctly what was meant by uniform distribution. This was usually expressed in terms of being ‘evenly or equally spread’.

Question 12

Most students were able to write a suitable equation to show how proportional sampling could be used to estimate the total size of a population. There were a number of occasions where perfectly correct expressions of the equation were not credited with any marks, despite the Marking Guidelines including all the possible correct expressions. When difficulty was experienced by some students, they at least were able to use A as the numerator in their equation. Some assessors failed to award two marks for a correct expression of the equation, incorrectly only awarding one mark.

Question 13

(a) Many students were able to provide at least one correct assumption when using either of the two techniques. It was not necessary to include comparisons of the two methods. Credit could be awarded for difference by implication. Many students experienced difficulty expressing the second of the two marking points, when employing mark-release-recapture. These students suggested that the size of the sample was not required, rather than the size of the area or the size of the sampled region was not required.

(b) Some students experienced difficulty when explaining one assumption about the animals caught when either method was used. The correct assumption was that the animals caught were from the same population. This was incorrectly expressed as ‘the sample that was caught was in proportion to the size of the total population’.

Question 14

Most students were aware of the benefits of expressing birth rates as the number of births per 1000 people in a year. Unfortunately, some students only limited their response to the idea that it made comparison possible, without indicating what exactly could be compared. Few considered the idea of accounting for variation at different times of the year.

Question 15

Most students were able to identify correctly the two other factors necessary in order to calculate the total world population. Death rate, or the number of deaths were correctly identified, but some students indicated that they would need to know the number in the population in 2006. The students would need to know the number in the population at the start of 2007. Students, who referred to 2006, did not indicate that they would need to know the number in the population at the end of 2006.
Question 16

Most students responded appropriately making reference to immigration/emigration and birth and death rates. Some students indicated that death rates were also low, but were not credited with marks.

Question 17

Most students indicated that using numbers in a population pyramid would enable you to determine the population size. Some students went on to explain that this would allow future planning by either governments or local councils. Some students incorrectly gave a benefit of using percentages of males and females.

Question 18

Many students did not include a comparative statement in their response, simply indicating that there were low numbers of births or small numbers of elderly people in the population. It was not appropriate to give credit to such responses.

Question 19

(a) Some students employed their correctly derived equation from Question 12 in their answers. Many were able to express correct methods using either of the two approaches. Most students elected to employ a method which relied upon actual number rather than the approach which relied upon proportion of sufferers. It must be noted that the Marking Guidelines included paired statements. It was reported by moderators that some assessors had attempted to award marks by mixing paired statements.

(b) Many students experienced considerable difficulty expressing their ideas with sufficient precision, when they were evaluating the conclusion of the care worker. Some assessors awarded marks when the marking point had not been fully made. Many students recognised that the Figure 1 was not the UK pyramid and therefore may not be representative of the UK population. Some students further recognised that a cure for Alzheimer’s disease might be possible in the future. Some students experienced difficulty expressing the idea that the proportion of elderly people might increase, but not necessarily affect the actual number of sufferers.

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 www.aqa.org.uk/umsconversion