**General comments**

Moderators reported that it was pleasing to see that a high proportion of centres were assessing students at the correct level, though some were not. To maintain standards, assessors should ensure that all advice offered on the individual feedback forms, within the TOLS system and in the following pages is 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](http://filestore.aqa.org.uk/subjects/AQA-2410-W-TRB-ISAADMIN.PDF)) and also to the relevant JCQ instructions for guidance on how to conduct the ISA in order to maintain the confidentiality and integrity of the ISA assessments.

Schools and colleges are also reminded that the statement in the Teachers’ Notes, ‘There **must** be no further discussion and students must **not** be given any further resources to prepare for the assessment’, applies from the time the students are given the title of the investigation one week before sitting Stage 1 all the way through until all students have completed the Written Test for the unit.

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.

Several centres are still completing separate CRF for their students. This is no longer a requirement since completion and signatures on the ISA front cover are the AQA replacement of the CRF. This should save centres additional, non-essential administrative work.

Addition and mark transfer errors were seen. It is strongly recommended that centres set up a system for checking this as it could seriously disadvantage individual students.

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 utmost to support the marking of a school or college. Marks are only changed when what was rewarded failed 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 and should be matched by the number of ticks within the student’s answer. 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 consideration of the mandatory points made in the *Comments* column was not always evident in the marking of 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.
ISA P – Investigating muscles as effectors

The practical task caused no issues.

Stage 1

Calculation of the index of fatigue caused no problems.

Stage 2

Question 2

The null hypothesis was generally well constructed, although some answers were too vague, with no reference either to tiring or to the two different muscle types/positions.

Question 3

Nearly all students selected the correct statistical test. It is recommended that students use the wording from the Students Statistics Sheet flowchart as the reason for their choice of test.

Question 4

Although often the untidy presentation of working made checking of the calculation difficult for assessor and moderator, most students could correctly calculate standard error for the two muscles. It is vital that students then go on to multiply the standard error by 2 and show this as 95% confidence limits, to give ranges around the mean. This demonstrates clearly they understand the principle of the test and can easily assess whether there is overlap for interpretation.

Question 5

Many students scored 2 marks here but too often the choice of wording was less than ideal. The interpretation must include a statement about whether the 95% confidence limits overlap, followed by whether this means there is a greater than, or less than, 0.05 probability that the difference in the mean results is due to chance and whether the null hypothesis should be accepted or rejected.
Written Test: Section A

Question 6

Most students achieved this mark, with mark point 1 being more common. Some attempted mark point 2 but did not express themselves clearly enough to fulfil the mark point.

Question 7

(a) Most students answered this successfully; most commonly with mark point 1.

(b) The idea that this allowed comparison was very common but not all students went on to give sufficient explanation to achieve the mark point; ‘muscles’ was underlined in the Marking Guidelines and so was an essential component of the mark point. The ‘fair test’ idea was less often seen but the same principle applied that further explanation was necessary.

Question 8

Most students achieved this mark point with all mark points being seen.

Question 9

(a) Again, most students achieved this mark with all mark points being seen.

(b) Mark point 3 was the most easily accessible and the most commonly awarded. Students often suggested there may be differences in age/sex but did not go on to relate this directly to this investigation as required by mark points 1 and 2.

Question 10

Most scored 3 marks here with storage of glycogen causing the most problems. Slow skeletal muscles respire aerobically, are supplied with sufficient glucose from the bloodstream and do not have a large store of glycogen.

Question 11

Mark point 2 was commonly seen as were many attempts at mark point 1 but many students did not include the idea of more/faster anaerobic respiration to fulfil the mark point. Mark point 3 was regularly seen but mark point 4 was rare.

Question 12

(a) Most students achieved mark point 1 but better answers were required to score both marks. Some students went on to state that muscles used ATP but ‘contraction’ was stipulated in the marking point. Some very good answers were seen with all three marking points given, together with extra detail about use of ATP by myosin.
(b) A lot of information was required in the answer to award this mark point: the muscle type; the hydrolysis/synthesis of ATP; and the fact that a high concentration of ATPase allows this to be rapid. Not many students managed to include all these requirements.

(c) The majority of students scored one mark here but a full explanation was required to gain two marks. Mark point 1 was commonly seen but the explanation in mark point 2 was less often seen. Some students noticed the lack of visible organelles.

Written Test: Section B

Question 13

It was vital that students used the information that was provided in the resource accurately rather than giving generalised methods of making data reliable. Mark points 1 and 2 could be awarded when given in a single statement such as, ‘several fields of view were selected at random’. In mark point 3 ‘species’ was essential, ‘same breed’ is not equivalent. Mark point 5 needed to be specific to the resource, i.e. that at least 8 animals were used in each group. General statements about each group having lots/large number of hamsters were insufficient.

Question 14

(a) Most students successfully carried out this calculation.

(b) Mark point 1 was most commonly seen. In this instance, ‘The calculation used an average’ was acceptable as equivalent to mean, as it demonstrates the correct understanding.

Question 15

(a) The occasional student suggested that this investigation was unethical as the hamsters would be in pain or stressed but the vast majority realised hamsters would be killed.

(b) Students encountered many problems with this question. Many only discussed changes ‘as the hamsters got older/younger’, rather than using the specific age groups. Some only discussed whether there was a change, or what the change was, rather than discussing the significance of this difference. Many students seemed unaware that it is not the ‘results’ that are deemed significant or not but the ‘differences between the results’. It was surprising at A2 that not more students achieved mark points 5 and 6. It was expected that students who had calculated standard error and 95% confidence limits in Stage 2 of this ISA would realise that standard deviation is insufficient to determine significance.

Question 16

(a) Nearly all students scored this mark; the wording in the resource should have been used, ‘long distance runners’ is not the name of the group.

(b) This was generally well answered and 2 marks were common. Mark point 3 was the least often awarded.
Question 17

This was well answered, although mark point 2 was not always awarded, even though it was attempted, due to lack of reference to ‘diameter’; students often referred to ‘thickness’ instead.

Question 18

Most students scored mark point 1 and many went on to give mark point 2 or 3.
ISA Q – Comparing electron transfer in mitochondria and chloroplasts

This practical technique to measure electron transfer in mitochondria was very successful and all centres saw a colour change in the DCPIP within a reasonable time period without much difficulty.

Stage 2

The same comments apply to those written above for ISA Option P.

Written Test: Section A

Question 5

Most students scored this mark with mark point 1 being the most common.

Question 6

(a) Most students achieved mark point 1 but then many did not successfully link it to this investigation to score mark point 2.

(b) Most students achieved this mark but some gave answers that were not specific to breaking cells as required by all mark points. Some students only referred to breaking cell walls which is not equivalent to breaking open cells.

Question 7

(a) Surprisingly, there were many poor answers to this fairly straightforward AS question. Statements referring to the water potential being ‘different’ were insufficient for mark point 1 or 2. Many students found it difficult to relate their answer to this particular investigation by describing movement of water specifically into the mitochondria for mark point 4 and 5.

(b) All three mark points were seen but few gave two correct reasons.

Question 8

The vast majority of students achieved this mark.

Question 9

This was similar to questions in previous papers and so was successfully answered by many students.

Question 10

Most students scored this mark.
Question 11

(a) This question required details of the similarities in the methodology; that both involved repeats was insufficient for credit. The statement that both ‘measured time taken for DCPIP to lose colour’ scored mark points 1 and 2.

(b) Many students scored two here, with many answers that fulfilled several of the options for mark point 2.

(c) Many students got confused here and gave the make up of the ‘standard’ that they set up in their task (the tube labelled B). This was not a control but simply provided a colour comparison to allow the end point to be determined. Question 11(c) required a true control that showed that it was the independent variable that was causing the change being measured as the dependent variable; i.e. the identical set up but without the chloroplast suspension (and with extra distilled water or isolation medium to keep the same volume).

Written Test: Section B

Question 12

Nearly all students scored 2 marks here with most achieving 3. Good answers incorporated all the mark points.

Question 13

Some students only repeated the information in the resource that ‘antidote reacts with/binds to cyanide’, some had the antidote destroying the cyanide and some referred to the cyanide as if it were an enzyme.

Question 14

(a) Many students only gave two trials in each group, rather than including all those that could be compared in each category as was required. The order in which the groups were given was not important.

(b) This question required students to identify overall trends/patterns in the data rather than just restating the figures for mark point 1 and 2. Similarly some form of calculation was required for mark point 3; calculations equivalent to those shown (for example relating different concentrations of cyanide to those given in the examples) were acceptable.

(c) Many students successfully calculated this percentage but a proportion of students made little or no attempt at this calculation.

Question 15

Most students achieved mark point 2 but mark point 1 needed reference to ‘aerobic’ respiration before the mark point could be awarded.
Question 16

(a) Again, mark point 1 needed reference to aerobic respiration, not just respiration. Good answers incorporated all three possible mark points.

(b) The vast majority of students achieved this mark.

Question 17

Some very good answers were seen to this question. Mark point 4 was uncommon but several students achieved the additional mark point by linking this to the information in Resource A; for example, by suggesting that cyanide did not bind so strongly to plant cytochrome oxidase, so had less inhibitory effect on this enzyme.

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