



## **General Certificate of Education**

# **Biology 2410**

**BIO6T      Investigative Skills Assignment  
(ISA)**

# **Report on the Examination**

*2010 examination - June series*

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## General Comments

Most centres had made great efforts to implement the ISA investigations suitably and to mark their candidates' scripts in accordance with the marking guidelines. Useful annotation was often included by centres to justify their marking. The marking of many centres was very accurate, but many more centres had marked more leniently this year than last year. Incorrect, partial or implied answers were sometimes credited, and centres gave marks for answers that were not on the marking guidelines. Marking was sometimes erratic within a centre with some scripts accurately marked and others leniently marked.

Many centres only submitted one ISA; P being submitted more often than Q. ISA P also tended to be more accurately marked than Q.

It was good to see evidence of internal standardisation, but it was sometimes difficult to determine which of the marks had been used in the final submission. Internal standardisation should be carried out in a different colour to the prime marking. The red ticks should then be modified to agree with the moderated mark.

Centres are reminded that ticks should be placed in red ink on the script at the point at which the mark is awarded. Some centres did not use ticks at all, simply ringing a sub total or presenting a number next to the question. This made the moderation process rather more difficult than it needed to be.

Some centres experienced problems interpreting some of the marking guidelines, paying insufficient attention to the emphasis placed on particular points. This resulted in credit being given to responses that failed to reflect the detail required by the marking guidelines. Where this was evident the centre was, however, usually consistent in acceptance of this limited response. In general, ISA P was marked more accurately than ISA Q.

There was a significant number of administrative problems such as addition errors, incorrect marks on the CRF and lack of a centre declaration sheet. A small number of centres failed to include the PSA mark when submitting the final mark. The most common problem was the lack of centre number and candidate number. These should be on every sheet submitted for moderation.

## Stage 2

Calculations were usually carried out correctly; however, some candidates left the result as a fraction. This was often incorrectly awarded credit by the centre. The correct statistical test was chosen by the vast majority and the test statistic was correctly calculated. Some candidates incorrectly omitted values which did not follow the pattern of the rest of their data.

Errors were evident in two areas.

Some centres marked null hypothesis very generously, for example giving credit to statements of fact about light intensity and rates of photosynthesis without reference to a relationship or correlation between the two variables. This was equally true in ISA Q where hypotheses were credited which did not refer to a difference in rate of movement at the two temperatures.

Null hypotheses were not always the most appropriate for the investigation. They should be formulated using the independent variable and dependent variables from the title of the investigation.

The second area where centres were too lenient was in awarding credit for the interpretation of the test statistic. Many centres gave credit when there was no reference to probability.

## **BIO6T/P10**

### **ISA Written Test**

#### **Question 6**

The vast majority of candidates recognised that the bubbles contained oxygen and that this was a product of photosynthesis. They also indicated that a higher rate of photosynthesis would cause more bubbles to be released. Some centres gave full credit when candidates discussed increased rates of photosynthesis and oxygen production in isolation from the investigation, no reference being made to bubbles.

#### **Question 7**

- (a) Many candidates clearly recognised that a rise in temperature would cause more bubbles to be produced in a set period of time, as the rate of photosynthesis would be higher. Some candidates were able to link this to increased enzyme activity. Some discussed the effect on enzyme activity with no reference to photosynthesis. Many centres did not follow the marking guidelines and gave two marks for an explanation in which candidates did not relate the effect of the temperature rise to bubbling. Unfortunately, some candidates believed that the rise would cause the denaturation of the photosynthetic enzymes, even though it was too small to do this. Some centres gave credit for such arguments.
- (b) There was good understanding of this question. Two common incorrect answers were the use of a water bath without mentioning that the sides would have to be transparent, and (iii) allowing the bulb and water to cool before changing the distance between the lamp and the plant. Some centres gave credit here.

#### **Question 8**

The vast majority of candidates responded correctly.

#### **Question 9**

The answer to this question was badly expressed by many candidates. Terms such as adapting, acclimatising to and becoming accustomed to, were considered inappropriate. Centres often gave credit for vague or incomplete answers. Some reference to adjustment of the rate of photosynthesis to the new light intensity was required in the answer.

#### **Question 10**

Both parts of this question were well understood by the vast majority and marked to the correct standard.

### **Question 11**

This was well understood by the vast majority and marked to the correct standard. There was some evidence of confusion with carbon dioxide and oxygen. Some candidates incorrectly suggested that carbon dioxide was being used in respiration.

### **Question 12**

Considerable confusion was evident between light duration and light intensity in candidate responses. There seemed to be little appreciation that light intensity would affect the rate of photosynthesis and light duration would only affect the time available for photosynthesis. It was not possible to credit references to light intensity although many centres did so.

Many candidates correctly recognised that it was essential to monitor the number of hours of sunshine to check that both crops were experiencing similar levels.

### **Question 13**

All factors were seen in responses. The explanations were often weak and were not sufficiently precise to award the mark correctly. Light intensity, light and carbon dioxide were regularly seen but were ~~these~~ often incorrectly awarded marks by the centre.

### **Question 14**

- (a) This was correctly answered by the vast majority, although some candidates simply stated that the yield increased. This was incorrectly given credit by some centres.
- (b) This was well understood by the vast majority and marked at the correct level. Some candidates did not answer the question and wrote about differences in mean monthly values rather than in some weeks of the year.

### **Question 15**

This was well answered and marked at the correct level, two marks being scored frequently. Centres tended to be over-generous in awarding one mark, accepting either of the figures in the marking guidelines instead of requiring both to be present. Incorrect responses usually involved candidates expressing a response based on  $0.42/1.25$ , giving an answer of 33.6%.

### **Question 16**

Most candidates indicated that the addition of extra carbon dioxide would incur costs and realised that the price of tomatoes would also have to be taken into account. A smaller but significant number of candidates realised that customer demand would also be important. This question was generally marked at the correct level.

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**Question 17**

Many candidates realised that the lowest price was paid for tomatoes during this period. They also observed that there were weeks when there were decreased yields. The more discerning candidates recognised that the yield showed little or no increase in the summer. These candidates also successfully linked the opening of windows to reduce temperature and improved ventilation with the reduced carbon dioxide levels.

**Question 18**

Most candidates failed to appreciate that the control would be improved if the experiment took place at the same time. When candidates did appreciate that it would be sensible to ensure that the plants experienced the same growing or environmental conditions, they unfortunately did not express this clearly enough, or failed to mention specific conditions of light and temperature. This question was often too generously marked, with credit being awarded for answers which were below the standard expected by the marking guidelines.

**Question 19**

- (a) This was well answered by the vast majority.
- (b) This was poorly answered. Most candidates could offer little more than a reference to the number of wasps that should be released. Little evidence was seen of when to release wasps, or of determining how effective the method was.
- (c) Many candidates tried to indicate that the scientists would not know the proportion of the population caught. Unfortunately they expressed this idea by stating that not all the whitefly would be caught, and some centres gave credit for this.
- (d) This answer attracted a good selection of correct responses.

**Question 20**

Candidates frequently scored marks for references to leaving the traps for same period of time and then counting the number of whitefly stuck to the surface of the trap. The vast majority gained little further credit. The need for traps to have the same surface area, to be equally sticky or to be suspended at the same height was not recognised. It was not uncommon for candidates to make sure that the same number of yellow and red traps was used. However, they failed to indicate that a large number would be necessary. When a number was suggested, candidates should have been aware that three traps of each sort would have been insufficient to gain a representative sample of the population. A statistical test on the basis of these numbers would not be valid. The time for which the traps were left was often not specified, with many candidates referring to “a few days”. In these answers it was not clear that both sets of traps should be left for the same length of time. It was pleasing to see that many candidates intended to use a statistical test. Unfortunately, many failed to indicate that this was to determine whether there was a significant difference between the results for each of the two colours. There was often very generous marking of this question, with marks awarded for points not in the marking guidelines such as giving the colour of traps, or referring to the same number or placement of the traps. The same mark was also occasionally awarded twice.

## **BIO6T/Q10**

### **ISA Written Test**

#### **Question 5**

- (a) There was good understanding of the purpose of leaving the animals in the tube for 5 minutes at 30°C. Some centres gave credit when terms such as adjust, adapt or acclimatise were used without further qualification. These terms suggest tolerance to new situations rather than equilibrating to the new environment.
- (b) This was well understood by the vast majority.

#### **Question 6**

The temperature of the water bath and the temperature of the room were usually identified correctly. When reasons were provided, it was normally because candidates were aware that these temperatures would not be constant. Some centres gave credit for simply mentioning the correct temperatures to be monitored.

#### **Question 7**

A variety of correct factors were seen: the size of animal, its position and light intensity. Errors occurred when candidates named light as their chosen factor with no further qualification. Some centres gave credit for this factor. The explanation was normally correct. The procedure referred to the duration of the counting time, size of the Petri dish and the number of animals used. As these factors were not decided by the candidates, they should not have been credited these as correct responses.

#### **Question 8**

Centres usually marked this question at the right level.

The majority of candidates decided that this was not a valid decision and usually provided one of two reasons. Most correctly believed that each animal would behave in a different ways and many suggested that the animal would become tired.

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**Question 9**

- (a) Many candidates did not make their responses sufficiently precise and discussed the production of misleading results or misleading values for the rate of movement. They failed to develop their responses to indicate if this would be an over- or under-estimate of the rate. Successful responses which were correctly marked usually scored one mark. Centres tended to give marks for answers which were totally different to those in the marking guidelines, or when only part of the marking point had been met.
- (b) It was rare to see a correct response with only a minority of candidates referring to identification of anomalous data.

**Question 10**

- (a) The vast majority of candidates suggested that ruling more lines on the Petri dish would improve the accuracy of the result, with many centres incorrectly credited this as a valid answer. Ruling more lines would allow greater discrimination, because there would be greater precision possible.
- (b) This was well understood by the vast majority. Some centres gave credit for more limited responses, for example, leaving dirt or contaminants on the dish.

**Question 11**

Candidates recognised that temperatures were generally higher and also suggested that the temperature fluctuated. This question was usually marked at the correct level. It was less common for candidates to identify that the trend in the data may have been due to chance.

**Question 12**

This was well understood with the vast majority scoring two or more marks. It was marked at the correct level by most centres. Most commonly the null hypothesis was absent in responses. Many accounts provided extensive unnecessary detail about calculating the test statistic. This was often incorrectly given credit.

**Question 13**

- (a) Only a very small number of candidates established valid links between egg-laying and daylength. Very few candidates realised that daylength was related to a particular time of year. Too many answers which did not correspond to points on the marking guidelines were credited by centres. Credit was also often incorrectly given for synchronising egg-laying rather than breeding behaviour.
- (b) Candidates had more success with the relationship of egg-laying and temperature. They established links with availability of food and an increase in insect numbers. Many candidates, however, discussed body temperature and survival of young and this was incorrectly credited by some centres. Others answered in terms of temperature affecting egg hatching.



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**Question 14**

This was well answered by the vast majority and marked at the correct level.

**Question 15**

Many candidates were able to use the data supplied to suggest that the date of egg-laying would be imprecise. Many answers were linked to the collection of data by volunteers, candidates considering that as a consequence the data were unreliable and the conclusions that could be drawn were debatable. Again answers not meeting the requirements of those in the marking guidelines, such as 'don't know when the eggs were laid', were credited.

**Question 16**

- (a) Many candidates failed to develop their responses to indicate that a large sample would be more representative of the population. Some centres credited any reference to a large sample. 'Increased reliability' was often given as an answer with no further explanation, and this was often credited by the centre.
- (b) This was well understood by the vast majority.

**Question 17**

Although many candidates recognised that the adults were surviving winter, very few were able to suggest that this would result in young being produced in greater numbers or would be produced earlier in the season. It was only the most discerning candidates who were able to recognise that higher temperatures earlier in the year would give more time for aphid production. This question was very generously marked, with centres tending to award a mark when only part of the marking point was given.

**Question 18**

- (a) Although attempts at both methods were seen, there were very few fully correct responses. Occasionally the incorrect dates and years were used in otherwise correct responses. When marks were awarded, one mark was the norm.
- (b) (i) This was well answered by the vast majority and one mark was scored by most. Sometimes centres awarded two marks for the idea of combining chemical and biological control.
- (b) (ii) This presented considerable difficulty to almost all candidates, who did not seem to understand that mathematical models could be used to make predictions. Centres tended to award marks for answers which were significantly less detailed or precise than those in the marking guidelines. Very often there was no mention of any prediction but marks were still awarded.