Moderators' Report/ Principal Moderator Feedback

Summer 2016

Pearson Edexcel GCE in Biology (6BI06) Practical Biology and Investigative Skills

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General Comments

Whilst the overall pattern of investigations was similar to previous years, it was disappointing to see that a number of specific weaknesses which had been highlighted in these reports and in support materials were repeated and awarded high marks in centre assessment, or were limiting factors in 1B externally assessed reports. Some examples are described in the comments on individual criteria.

Moderators found it very difficult to support centre marks where all candidates were awarded totals indicating that these were of the very highest A2 level quality yet candidate reports did not provide any evidence of higher level HSW skills. Many internally assessed samples showed clear annotation and a good knowledge of the standards expected at this level, with marks in close agreement with moderation. Where there were significant differences between centre and moderated marks the most common causes were:

(a) a lack of quality judgements resulting in similar, high mark ranges being awarded to all candidates' attempts to address a criterion without sufficient regard to progression to A2 level. At times this meant that differentials between reports of different quality were significantly eroded.

(b) a lack of detailed attention to each sub-section of the criteria and hence a rigorous application of the hierarchical marking rule.

It is a fundamental principle of external examinations that credit can only be given where there is clear evidence of the candidates' individual ability to match the requirements of the criteria, a point often repeated in these reports. Despite this, examiners and moderators were sometimes faced with the difficult task of identifying individual contributions where all candidates adopted an identical, heavily directed approach often deflecting them from independent thinking and in some cases leading them away from the application of basic scientific common sense let alone providing evidence of a balanced objective approach.

There were many, often high quality, reports which were far too long. This was frequently caused by the inclusion of irrelevant material or excessive repetition (e.g more than 20 statistical tests). Whilst the effort involved was commendable, most would have achieved similar marks with considerable reductions in length.

Research & Rationale

There were many high-quality attempts to research the biological background of investigations and to place them in a relevant context for R(a). However, merely searching basic revision websites for alternative diagrams of common textbook core material such as the biochemistry of photosynthesis was rarely relevant. R(b) was much more variable, especially where useful research was ignored in planning. This was evident in fieldwork investigations where some excellent

research into individual species clearly pointed to important concepts of competition and niche but no attempt was made to collect suitable data.

Planning

Whilst many candidates took full advantage of the numerous opportunities offered by fieldwork investigations, others were constrained by attempting to follow a fixed pathway rather than using their understanding of ecological principles. The use of running means is a recognised technique for selecting sample size but many simply used this to draw multiple graphs of abiotic data with as little as 3 readings, without more important thought about their main data. In one case this led to the collection of over 200 light readings in a transect whilst the fact that more than 60% of the quadrats did not contain the organism under investigation was ignored.

A number of trial investigations were trivial. Despite comments in previous reports numerous candidates still claimed to need a trial to discover a vernier calliper was more accurate than a 30cm ruler!

Some 'growth' investigations were very weak. Simply growing cress seeds in uncontrolled conditions and suggesting that initial stem length was accounted for by photosynthesis was of very poor A2 quality.

It is assumed that all candidates will have full details of core practicals and therefore cannot be given more than very modest marks for planning where there is no further evidence that these protocols have been used in a novel way. The problems of simply adding a variety of substances to bacterial lawns without regard for their full ingredients or basic comparability remained and naive suggestions such as adding lemon juice might be a step towards solving the antibiotic resistance problem could only be given very limited credit.

Observing

Generally this was a high-scoring section, but moderators and examiners could not support the highest mark ranges where sensible and consistent levels of precision had not been tabulated. Merely calculating a mean cannot justify large increases in the recorded precision of the data.

The examiners have explained that, where there are no obvious anomalies, candidates need only give a brief explanation of their reasoning in order to meet the higher level mark ranges in O(b). The number of candidates who found large anomalies which fell back perfectly into line on re-measurement was remarkable.

Interpreting & Evaluating

Most candidates were able to select and apply a relevant statistical test and therefore provide good evidence for the award of higher mark ranges for I(a).

In common with previous years, I(b) and I(c) were much more discriminating. At this level it was expected that candidates would be highly objective in their biological explanations of trends and patterns in their data, using carefully selected references to support their arguments in I(b). This approach was quite rare with more general assertions and unfounded confidence in attributing causation in the light of a simple correlation or significant difference being more widespread. There were similar problems in I(c), where the emphasis was on simple things which might have gone wrong rather than an analytical, evidence-based evaluation. Many used correlation tests and scatter graphs which provided a very useful pathway into this process, but even a balanced discussion on the problems of possible false correlations was very rare.

Communicating

The numerous strands to this single criterion mean it is essential to award a mark range for each criterion section before aggregating these into a final mark for C. This is the approach taken by all examiners but it was not always clear in centre assessment. In extreme cases C5-6 was awarded when there was no graphical presentation at all or where there were multiple very basic graphical errors for C(b). Despite frequent comments in these reports there were many examples of the use of random sample numbers as an axis, these were then used to pair data which was obviously invalid and it was not uncommon for these discrete measurements to be joined by straight lines.

Whilst the range of comments for evaluating sources in C(d) continued to improve, a large number of candidates simply quoted web URLs in their bibliography without naming the actual journal they claimed to have researched. Better candidates used academic sources to give interesting insights into their investigations, but others were of very dubious relevance to the actual investigation.

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