# Moderators' Report/ Principal Moderator Feedback

## Summer 2016

Pearson Edexcel GCE
in Biology (6BI03)
Practical Biology and Research Skills

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## Grade Boundaries

Grade boundaries for this, and all other papers, can be found on the website on this link:

## Research Skills
Unit 3 involves generic 'How Science Works' skills and so the actual topic could be anything! It could be a Visit; it could be a Topical Issue. There is no limit on word length. The students need to:

- Identify and describe a biological problem;
- Discuss how scientists are solving this problem, giving the data or evidence;
- Show how effective or appropriate this solution is, giving the data or evidence;
- Identify the implications of the scientists work, including any benefits or risks;
- Identify and discuss any possible alternative solutions, in the light of the implications;
- Use source material and quotes, both web and non-web;
- Acknowledge these sources;
- Evaluate these sources, giving the evidence for validity;
- Communicate ideas effectively, using relevant visuals.

## Types of reports.
This analysis is based on a random sample of 192 reports, almost entirely resits.

The percentage of Visits was only 15.1% which is better than last year but still rather low, the most popular venues for visits being London Zoo, with a small number going to farms or an international centre for birds of prey.

This sample showed that the variety of Issue reports stayed about the same. The most popular Issue reports were HIV, Alzheimer's and Malaria together with Ebola Virus, Colony collapse disorder, Diabetes, Parkinson's, Breast Cancer and Epilepsy.

| Issue Topic | % |
|---|---|
| HIV | 8.0 |
| Alzheimer's | 7.4 |
| Malaria | 7.4 |
| Ebola virus | 4.3 |
| Colony collapse disorder | 3.1 |
| Diabetes | 3.1 |
| Parkinson's | 3.1 |
| Breast cancer | 2.5 |
| Epilepsy | 2.5 |
| Cervical cancer | 1.8 |
| ADHD | 1.2 |
| Amur leopard | 1.2 |
| Black rhinos | 1.2 |
| Caffeine | 1.2 |
| Chimpanzee conservation | 1.2 |
| Deep vein thrombosis | 1.2 |
| Infertility | 1.2 |
| Lung cancer | 1.2 |

together with (in equal order of frequency,  Osteoporosis, Polar bears, Pygmy hippos, Sickle cell anaemia, Statins, Amazon rainforest, Antibiotic resistance, Aplastic anaemia, Atrial fibrillation, Bacteriophages and antibiotic resistant bacteria, Barred Owl, Beavers, Birth control pills, Blood transfusions, Brain tumour, Burmese pythons, Cancer, Cerebral palsy, Climate change and reptiles, Coral reefs, Crohn's disease, Cystic fibrosis, Dengue fever, Dorsal spinal impingement in horses, European corn borer, Feeding a growing population, Foetal Alcohol Syndrome, Foot & Mouth, Galapagos conservation, Galapagos tortoises, Glaucoma, Human limb regeneration, Huntingdon's and stem cells, Iberian lynx Invasive species, Leukaemia, Lymphatic filariasis, Malnutrition, Marijuana, Meningitis, Multiple sclerosis, Myocardial infarction, Narcolepsy, Northern Rock hopper Penguin, Oestrogen positive breast cancer, Onchocerciasis, Organ transplants, Passive smoking, Polio, Progeria, Prostate cancer, Schizophrenia, Smoking, Snow leopard conservation, Socorro Dove, Sumatran Tiger, TB, Testicular torsion, Thalassaemia, Whooping cough
Xenografts, Down's syndrome, Pancreatic cancer, Cardiomyogenesis, Passenger pigeon, Therapeutic cloning, Peanut allergy, Deer on Scottish Highlands, Glassy winged sharpshooter, HLA system, European wildcat, Insomnia.

**Marks awarded.**

The sample of scripts this summer showed a mean score of 30.3, better than last year and the same as in 2014. Again, there was no significant difference between the scores for Issues and Visits, despite the low number of Visits in the sample. Also, 11.5% of 'top' candidates in this sample got more than 36/40 marks which is not as good as the 13.9% from last year.

Although this sample is not necessarily representative of all candidates, it does compare well with preliminary data for the whole cohort which show the percentage of candidates achieving grade 'A' is 29.9%, better than last year's 28.3%.

In addition, at awarding in July, there was no significant difference between the means for moderated (1A) scripts and the examined ones (1B).

The distribution of marks in this sample for the various criteria is shown below as a percentage of the possible total ie. 100% for 1.1a would mean that all students got the maximum of 2 marks.

Overall, the distribution of the marks is very similar to previous years.

| Criteria | Description | 2015 (%) | 2016 (%) |
|---|---|---|---|
| 1.1a | Identify problem or question | 99.4 | 98.0 |
| 1.1b | Description of problem | 88.2 | 80.1 |
| 1.2a | Discuss methods or processes | 90.2 | 82.4 |
| 1.2b | Data or solutions to problem | 44.9 | 45.4 |
| 1.3a | Valid, reliable data / graphs, tables etc | 49.9 | 53.5 |
| 1.3b | Methods appropriate or effective? | 69.8 | 72.0 |
| 2.1a | Implications identified | 76.9 | 79.2 |
| 2.1b | Implications discussed | 55.9 | 63.9 |
| 2.2a | Advantages discussed | 67.6 | 72.0 |
| 2.2b | Risks discussed | 61.9 | 65.3 |
| 2.3a | One alternative solution discussed | 81.3 | 76.9 |
| 2.3b | Another alternative solution discussed | 71.2 | 66.8 |
| 3.1 | Sources used | 87.7 | 87.1 |
| 3.2a | Bibliography | 94.1 | 91.6 |
| 3.2b | Sources acknowledged in text | 82.4 | 82.1 |
| 3.3a | Sources valid or reliable? | 49.3 | 52.9 |
| 3.3b | Evidence for source validity | 23.4 | 14.2 |
| 4.1 | SPG / well set out | 95.5 | 90.5 |
| 4.2 | Technical language and visuals | 78.0 | 77.7 |

**Problem and scientists' solutions**
Compared to 2015, the data show that candidates are still pretty good at explaining precisely what the problem is, although they are still finding it more difficult to explain the biology behind the problem, 80.1% success compared to 88.2% last year.

There was no improvement in students' ability to describe what biologists actually do and give data or evidence to support the discussion, although there was a slight improvement in their ability to explain why these methods or solutions were effective or appropriate. However, there are still too many reports that are descriptive rather than analytical.

The % of reports on human diseases in this sample was 69%, compared with 68% in 2015, 50% in 2014, 57% in 2013, 42% in 2012, 49% in 2011 and 32% in 2010.

This considerable emphasis on diseases does indicate a clear problem to solve but far too many students are still including graphs, data and methodology that they clearly do not understand. A significant number simply paste details of drug trials in with little of their own comment even though these are resits.

**Implications and alternatives**
Compared with last year, slightly more candidates could identify the implications of the methods or solutions employed but were still not so good at explaining them. There was no further improvement in discussing alternative strategies for solving the problem outlined.

**Source material**
There was no obvious improvement in using source material and acknowledging it. Students still find it difficult to give a reasoned opinion on whether their source material was valid. Still too many simply quoted the scientists' qualifications or expertise rather than focus on the source material itself. The use of data or evidence in this discussion of source validity was considerably worse than last year, 14.2% compared with 23.4% last year, probably because so many candidates were resits and had never really mastered source evaluation in the first place. Source evaluation remains the major source of weakness in most candidates but it also remains an extremely good discriminator.

**Communication**
There was no improvement in communication and although most reports were very well written and presented, a few were still short of appropriate 'visuals' in the form of graphs, tables etc. Too many reports used graphs or diagrams of very poor quality, sometimes almost impossible to read. There is nothing wrong with redrawing or replotting these to aid understanding as long as the source is then acknowledged.

**Inappropriate reports**
This year, there seemed to be a surprising increase in the number of reports that did not cover the criteria at all. There were a few reports that were simply a core practical such as Daphnia heart beat rate, written as an attempt to look at the effect of caffeine on coronary heart disease. Others were mini investigations based on a core practical. In both cases, these candidates seemed to be external students for the exam centre who were studying through distance learning tutoring companies. The centre had clearly given poor advice about the requirements of the coursework.

**General comments from the examining and moderating team.**

In some cases, there was little evidence that candidates had done anything to improve on their previous scores, but overall there was some improvement because the majority of the reports were resits.

Many of the scripts were not visit or issue reports at all but just an essay on a biological topic and not covering all the assessment criteria. Work was often a continuous essay with few paragraphs.

The majority of reports focused on diseases and this allowed more data to be included by many students, although not always successfully.

For the 1A moderated option, there were some centres that were far too generous with their marking, which is surprising after 8 years of advice and feedback such as this report.

By far the majority were human diseases, with quite a number on mental health issues; the problem with the mental health reports was that data was rather sparse. The very few that chose to write about endangered species found data hard to access and some resorted to including data about a different species.

## Problem
- *Many still did not pose a question or state a problem but just gave a title such as 'Malaria' or 'Alzheimer's'.*

## Methodology
- *In 1.2, real practical details such as how a drug was administered or how an endangered species was kept in a wild life park or zoo were not always covered in sufficient detail. Where 1.2 was explained well, few went on to explain the effectiveness of the methods used in 1.3.*
- *Most had the idea of this section being related to the scientists' work rather than how the drug works. Some reports indicated a significant amount of research in finding several relevant drug trials with data.*
- *Some chose their subject wisely and found plenty of data for 1.2b and 1.3 and there were some very detailed analyses of the effectiveness of the solution, and the reliability and validity of the data, way in excess of what was required. However, this was not typical and the second major loss of marks was lack of data for both 1.2b and/or 1.3.*

## Implications
- *In 2.1, a surprising number of candidates failed to identify and explain two implications of their solution. Most mentioned side effects in 2.2 but few listed any real benefits.*
- *Criteria 2.1 and 2.2 were a bit of a mixture. Only a few related to the problem rather than the solution which was pleasing. Most addressed ethics or economics well but discussions of the social implications were rather vague. Some struggled with identifying benefits more than with identifying risks and resorted to repeating their comments about effectiveness.*

## Alternatives
- *Alternative solutions were explained quite well.*

## Sources
- *In 3.1, very few candidates identified any real quotes and some also provided no non-web source. The bibliographies often ran to several pages, but some were not referenced in the texts.*
- *Some students seemed to lack an eye for detail with the referencing. Many lacked detailed enough references for web sources and surprisingly, some students were still using the standard textbook or revision guide as a non-web source.*

## Source evaluation
- *3.3 was not done well at all, with most of those who did attempt it failing to give more than the author's credentials or the status of the publication, with no real evidence to support claims of reliability or validity.*
- *By far the major loss of marks was in the evaluation of sources. There were still plenty of generalised assumptions being made about reliability and validity, such as '………. would have no reason to put false information' or, 'because it's been updated twice it must be reliable'. A significant number did not state the information they obtained and did not cross check it.*

## Communication
- *This was done well. Where marks were lost it was often because of a lack of useful images (for example the chemical structure of a drug with no annotation as to its relevance or an image of a bottle of drugs.)*

**Centre priorities (despite improvements, these are still priorities).**

- Using data or evidence when discussing how effective the scientists' work is;
- Ensuring that any data or evidence is legible and of good quality;
- Being able to give the evidence for any critical evaluation of source material or commenting on the validity or reliability of the data used for named sources.
- Being able to explain terms such as 'placebo', 'drug trial', 'reliable', 'valid' or 'peer review' rather than just give them.
- Giving the information itself when cross referencing and claiming that the 'information' from two sources agreed.

**Plagiarism**

*No reports were potential cases of malpractice, where candidates had lifted whole websites or parts of websites and had presented it as their own work.*

**Practical work and authentication sheets**

*Some centres are still not sending these in and have to be asked for them.*

*The authentication sheets are an essential guarantee from the centre that the work is the candidates' own.*

*John Dunkerton (2016)*