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Examiners' Report/ Principal Examiner Feedback

Summer 2014

Pearson Edexcel GCE in Biology (6BI03) Papers 1A/1B Practical Biology and Research

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Summer 2014
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Research Skills

Unit 3 involves generic 'How Science Works' skills and so the actual topic could 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 406 reports.

The % of Visits was about 40% which is much better than last year and about the same as in 2011. The most popular venues for visits were still zoos with a small number going to hospitals or places like Syngenta.

This sample showed that the ***variety*** of Issue reports stayed about the same. The most popular Issue reports were Alzheimer's and Malaria together with HIV, Parkinson's and Schizophrenia. Like last year, Obesity and Diabetes are also popular topics.

Issue Topic	**%**
Alzheimer's	3.3
Malaria	3.3
HIV	2.9
Parkinson's	2.5
Schizophrenia	2.5
Asthma	2.0
Diabetes	2.0
Obesity	2.0
Badger culling	1.6
Breast cancer	1.6
Cervical cancer	1.2
Multiple sclerosis	1.2
Brain cancer	1.2
Colony collapse disorder	1.2
Depression	1.2

Infertility	1.2
Leukaemia	1.2
Strokes	1.2
TB	1.2

together with (in equal order of frequency, CVD and exercise, Anorexia, Antibiotic resistance, Bees and pesticides, Biofuels, Bipolar disorder, Black rhino conservation, Diabetes & gene therapy, Hepatitis C, Lung cancer, Narcolepsy, Organ transplants, Sickle cell anaemia, Snow Leopard, Statins and high cholesterol, Tiger conservation, Xenotransplantation, Acne vulgaris, Addison's disease, ADHD, Alzheimer's and vaccinations, Amur tigers, Amyotrophic lateral sclerosis, Anterior cruciate ligament, Anti phospholipid syndrome and warfarin, Asian citrus Psyllid, Bioengineering, Black footed ferret conservation, Blood, Blood cancer and gene therapy, Bovine TB, Brain aneurysm, Brain transplant, BSE, Cancer, Canine distemper and tigers, Cannabis, Cannabis as a pain killer, Cardiolpegia arrest, Cassava mealybug, Cataracts, Cause of autism, Cervical cancer and heat maps, Choroideremia, Chronic back pain, Chytrid fungus, Clot busting drugs and 'wake up' stroke victims, Coeliac disease, Colour blindness, Contact lenses, Cornea blindness, Crown of thorn starfish and coral, CVD, Cystic fibrosis, Cystic Fibrosis and Kalydeco, Dementia, Diabetes and stem cells, Doping in sport, DRACO - the ultimate virus killer, Drinking milk, DVT, Ecological equilibrium, Epilepsy, Equine navicular disease, Fish Oil, Food allergies, Giant panda, Global warming, GM crops, Golden Lion Tamarin, Green light laser therapy, Haemolytic anaemia, Haemophilia, Heart disease and stem cells, HIV and antiretroviral therapy, HIV and condoms, HIV and gene therapy, Horse parasites, Huntingdon's disease, Hypertension, Hyperthyroidism, Hypoallergenic milk, Idiopathic pulmonary stenosis, Immune thrombocytopenia, Infertility, Insomnia, Keratosis pilaris, Kidney disease, Kiwi conservation, Large Blue Butterfly, Liver cirrhosis, Macular degeneration, Malaria and the RTS,S vaccine, Millipedes and sweet potato crops, Miscarriages, Muscular dystrophy, Myelomeningocele, Naked Mole Rats, Nanotechnology and fake bones, Non Hodgkins Type B Lymphoma, Osteogenesis imperfect, Osteoporosis, Overfishing, Pancreatic cancer, Panda breeding programmes, Pertussis vaccine, Phenytoine and epilepsy, Rabies, Red Deer, Red squirrels, Respiratory distress syndrome in babies, Retinitis pigmentosa, River blindness (Onchocerciasis), Rotator cuff repair, Saline treatment for Cystic Fibrosis, Schistosomiasis, SCID (Severe combined immunodeficiency), Skeletal muscle degeneration, Sleeping sickness, Spinal cord injuries, Starling decline, Statins guidelines, Stress, Sumatran tiger, Superbugs, Surgical glue, Systemic lupus erythematosus, Taenia solium, Testicular cancer, Thalassaemia, The Media and Behaviour, Tiger conservation, Trout and sea lice, Tumour paint, Type 1 diabetes, Ulcerative colitis, Universal flu vaccine, Video Games, White clawed crayfish, Whooping cough and Zebra fish heart regeneration.

Visit Topic	**%**
London Zoo	48.8
Woburn Safari Park	24.7
Syngenta, Jealott's Hill	18.5
Hospital	4.9
Medical centre	3.1

Marks awarded

The sample of scripts this summer showed a mean score of 30.3, much better than last year's score of 28.8 and 29.1 from 2012. Again, there was no significant difference between the scores for Issues and Visits. Also, 15.0% of 'top' candidates in this sample got more than 36/40 marks, compared with only 8% last year and 15.9% in 2012. This is very encouraging indeed.

Although this sample is not necessarily representative of all candidates, it does compare well with preliminary data for the whole cohort which shows a considerable increase in the % of candidates achieving grade 'A', 32.7% compared to 24.3% last year and 28.3% in 2012.

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 % of the possible total ie. 100% for 1.1a would mean that all students got the maximum of two marks.

Criteria	Description	2013 (%)	2014 (%)
1.1a	Identify problem or question	99.3	99.5
1.1b	Description of problem	75.5	85.2
1.2a	Discuss methods or processes	82.5	79.7
1.2b	Data or solutions to problem	42.1	39.2
1.3a	Valid, reliable data / graphs, tables etc	36.0	44.5
1.3b	Methods appropriate or effective?	61.2	59.1
2.1a	Implications identified	69.5	73.4
2.1b	Implications discussed	56.6	56.7
2.2a	Advantages discussed	64.5	66.3
2.2b	Risks discussed	61.6	62.2
2.3a	One alternative solution discussed	71.1	83.8
2.3b	Another alternative solution discussed	61.9	76.9
3.1	Sources used	89.2	92.3
3.2a	Bibliography	97.5	92.4
3.2b	Sources acknowledged in text	76.9	75.9
3.3a	Sources valid or reliable?	51.5	64.6*
3.3b	Evidence for source validity	17.6	26.5
4.1	SPG / well set out	83.7	82.9
4.2	Technical language and visuals	75.8	67.6

Problem and scientists' solutions

Compared to 2013, the data show that candidates are better again at explaining precisely what the problem is. Although they are still finding it more difficult to explain the biology behind the problem, there has been an improvement, 85.2% success compared to 75.5% last year.

As in previous years, some reports still just posed a question which was very difficult to answer in terms of a solution or providing data. A few are still describing the problem in great detail and often any data or evidence relates to the problem itself rather than the solution.

There was no obvious improvement in students' ability to describe what biologists actually do and give data or evidence to support the discussion. Nor was there any improvement in their ability to explain why these methods or solutions were effective or appropriate. There are still too many reports that are descriptive rather than analytical.

The % of reports on human diseases in this sample was 50%, compared with 57% last year, 42% in 2012, 49% in 2011 and 32% in 2010.

This 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. Sometimes, the data or diagrams were of very poor quality and difficult to read. It cannot be stressed too highly that candidates will only be given credit for their own analysis of the evidence, not what the scientists think.

Implications and alternatives

Compared with last year, more candidates could identify the implications of the methods or solutions employed but were still not so good at explaining them. There was a marked improvement in discussing alternative strategies for solving the problem outlined.

Source material

Students in this sample were better at using source material and acknowledging it. In addition, although still difficult, there was an improvement in giving a reasoned opinion on whether their source material was valid, 64.6% compared to 51.5% last year. However, 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 showed some improvement, 26.5% compared to 17.6% last year. Although this is welcome, it remains the major source of weakness in most candidates' source evaluation.

Source evaluation remains an extremely good discriminator.

Communication

Most reports were very well written and presented but some 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.

General comments from the examining and moderating team

There were some excellent pieces of work this year, showing full understanding of the criteria, both in option 1A and 1B. The use of sub headings has helped candidates address the criteria more clearly. However, this year, there were fewer unusual topics and many on a variety of diseases or conditions.

Section 1

- When the problem is clearly identified as a problem it makes marks easier to access; when it is phrased as a question, it makes it much harder to award marks. The description of the problem is much more relevant and precise compared to last year.

- This section was completed well by most candidates but a very small minority of candidates did not identify a clear problem because they were producing a 'review-style' report that was inappropriate for assessment (e.g. the ethical implications of gene therapy).

- More students described methods that produced data but some just gave a list of up to four methods or solutions so that the alternatives were not at all obvious.

- Many candidates had insufficient detail on methods and relied too heavily on unexplained technical jargon that had obviously been lifted directly from source.

- Many candidates did not include enough detail on methods employed by scientists and instead provided an overview that was insufficiently focused. For instance, many reported that scientific trials had been implemented by a university – but then failed to describe how these trials were carried out (e.g. dose and administration of a test drug).

- A large number of candidates cluttered this section with a huge amount of technical jargon that was not explained and clearly not appropriate for AS level. This jargon often over-spilled into tables and graphs.

- There is still some confusion about the meaning of ‘biological methods’. Where candidates had identified a number of ‘main solutions’ they disadvantaged themselves because there was rarely one of the main solutions that met all the criteria and the ‘best fit’ had to be found for one of the solutions. It is best to choose one main solution and address all of 1.2 – 2.2 through this.

- Despite some really good high scoring scripts for 1.2 and 1.3 showing good use of data, there are still a lot who are not evaluating the validity and reliability of data. There are still some scripts which contain no data at all about the methods or solution. Quite a few scripts started the ‘methods’ section by saying there was no actual data about the solution but..... and they carried on describing the solution! It is important for teachers to emphasise the importance of searching for data before embarking on the project.

Section 2

- Some confused 2.1 and 2.2 and did not distinguish between them at all clearly.

- In some cases, it was problematical in awarding credit because it was difficult to identify original comments made by the candidate.

- In some cases these sections were addressed together under the same heading (e.g. ‘Implications’), which meant that there was considerable overlap – and therefore fewer marks could be awarded.

- Generally, section 2.2a was the weakest section: many candidates clearly struggled in coming up with any benefit that went beyond ‘the drugs improve the quality of life’, or equivalent.

- Still some giving implications in 2.1 related to the problem, but these are now few and far between. Some were going over the top about implications and some addressing 2.1 and 2.2 through their alternative solutions as well as their main solution.

- Fewer candidates this year were wrongly applying their implications to the problem, rather than the solution. This error seemed to be confined to some isolated centres.

- Alternative solutions were usually described well. In some cases the accounts were excessive because the candidates had wrongly explained implications for this section – in addition to the main solution. This is a significant issue for some centres, where some candidates has prepared pages of extraneous material and has therefore wasted their time doing this.

Section 3

- Quotes were not always clear and some were still not giving a non-web source.

- Source evaluation was better but some are still not explaining peer review and just what it means.

- Many candidates still find it difficult to evaluate material – and many don't understand what 'evaluation' means. Too many of them resort to meaningless (and highly subjective) statements about qualifications of the scientists involved. Candidates need much better guidance (or, perhaps, a reminder) regarding validity of data (e.g. in terms of sample size, representativeness) and the technique of cross-referencing. Most need to elaborate on their use of 'peer-review' as a criterion too.

- When cross referencing, some were just using simple facts such as tigers are mammals or cystic fibrosis is a genetic disease!

- Many candidates used good techniques for bibliography and citations. The vast majority of candidates cited their source material. Many candidates could improve their score very easily by remembering to include a sourced quote and an appropriate non-web source.

- Some candidates from a few centres still expected credit for using an A level biology textbook.

- Quotes and the non-web source were not always obvious in the text. There were quite a number with no non-web source and some just using SNAB textbook.

- There was little evidence of improvement in terms of evaluation of sources both in 1A and 1B; centres are awarding marks in 3.3a and b that are not justified. By far the majority of source evaluations referred to general comments about reliability and made assumptions that, for example, because someone had a qualification or were producing information for the public, this made them totally reliable.

Section 4

- Some graphs were far too small and some unreadable.
- The range of visuals was sometimes quite poor but better than last year.
- English and use of technical terminology were generally very good but there were still some reports with quite poor spg. Under-scoring in this section was generally down to missing or inadequate subheadings or a poor range of visuals.
- Some candidates did not include any graphs, even when the nature of their material would have facilitated this very easily. A significant number of candidates used excessive technical jargon in their text and visuals. In some cases, it was very clear that they did not understand the meaning of this jargon.

Centre priorities (despite improvements, these are still priorities)

• Being able to discuss what scientists actually do when solving a problem and giving the evidence;

• 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

Only five reports were potential cases of malpractice, where candidates had lifted whole websites or parts of websites and had presented it as their own work. Although cases of suspected malpractice are still very small in number, centres must remember that they are responsible for their students properly acknowledging source material. Centres also need to remember that only the students' comments will be credited, not the views of the scientists, unless commented on by the student.

Practical work and authentication sheets

Some centres are still not sending these in and have to be asked for them. One centre did not even include the name of the school, making it very difficult to trace.

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

Grade Boundaries

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

http://www.edexcel.com/iwantto/Pages/grade-boundaries.aspx

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