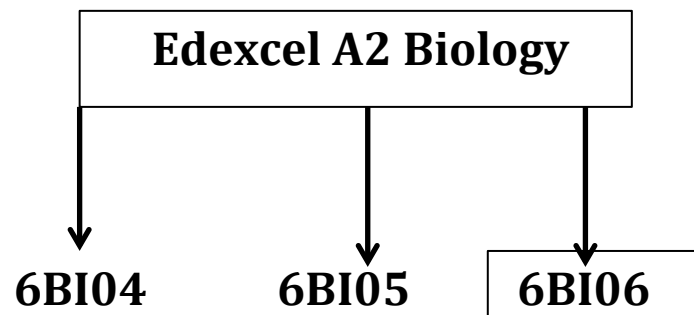


Edexcel A2 Biology

6BI06:
Practical
Biology and
Investigative
skills



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Unit 6BI06: Practical <i>Biology and Investigative skills</i>	Paper code: 6BI06																								
1. Exam paper- Practical Biology and Investigative Skills Internal assessment	10 % of Advanced GCE Biology																								
<p>Overview of content</p> <p>1. Individual investigation (45 marks): Students will complete a word-processed report of an experimental investigation, which they have devised and carried out. The investigation must be linked to the content of the course. The report is student's own work and submitted electronically to Pearson.</p> <p>2. Practical skills record: Teacher's are instructed to carry out practical covering 6BI04 and 6BI05 of the specification. The teacher verifies the practical work by completing verification of practical skills record with Pearson.</p>																									
<p>Overview of assessment</p> <p>1. Teachers mark the report according to the criteria laid by Pearson.</p> <p>2. The total marks of Individual investigation are 45.</p> <p>3. Grades A*–E are available.</p> <p>4. Grades assessment by year:</p> <table border="1" data-bbox="443 1160 1214 1480"> <thead> <tr> <th>Year</th> <th>Raw Marks to 90 % UMS - A*</th> <th>Raw Marks to 80 % UMS grade 'A'</th> </tr> </thead> <tbody> <tr> <td>Jun 2009</td> <td>-</td> <td>-</td> </tr> <tr> <td>Jun 2010</td> <td>38</td> <td>37</td> </tr> <tr> <td>Jun 2011</td> <td>38</td> <td>37</td> </tr> <tr> <td>Jun 2012</td> <td>38</td> <td>37</td> </tr> <tr> <td>Jun 2013</td> <td>38</td> <td>37</td> </tr> <tr> <td>Jun 2014</td> <td>38</td> <td>37</td> </tr> <tr> <td>Jun 2015</td> <td>?</td> <td>?</td> </tr> </tbody> </table>		Year	Raw Marks to 90 % UMS - A*	Raw Marks to 80 % UMS grade 'A'	Jun 2009	-	-	Jun 2010	38	37	Jun 2011	38	37	Jun 2012	38	37	Jun 2013	38	37	Jun 2014	38	37	Jun 2015	?	?
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Assessment criteria	Level of response	Mark range
Research and rationale	<p>a There is some attempt to provide a rationale for the choice of investigation in terms of its scope and its relation to biological principles.</p> <p>b Few sources are consulted and their scope is limited in providing a context for the investigation, to assist with the planning or execution of laboratory or field work, or in informing the interpretation of results.</p>	0–2 marks
	<p>a There is a partial rationale for the choice of investigation. The biological background to the investigation is developed to some extent.</p> <p>b Information gathered from some relevant sources has some bearing on the context for the investigation, and assists, in a limited way, with the planning or execution of laboratory or field work, or to inform the interpretation of results.</p>	3–6 marks
	<p>a The rationale for the investigation is clear, in terms of its scope and relationship to biological principles.</p> <p>b Several relevant sources are consulted, and are used to provide a context for the project, to assist with the planning or execution of laboratory or field work, and to inform the interpretation of results.</p>	7–9 marks
	<p>a The rationale for the investigation is clearly justified in terms of its scope and appropriate biological principles are discussed.</p> <p>b Additional sources, beyond those that were most readily to hand or were initially suggested by the teacher, are selected. The material chosen is selected for its relevance to the investigation and it is used effectively to provide a context for the project, to assist with the planning or execution of laboratory or field work, and to inform the interpretation of results.</p>	10–11 marks

Assessment criteria	Level of response	Mark range
Planning	<p>a There is some attempt to plan and to select the method or apparatus chosen. Some relevant variables are identified.</p> <p>b Some potential safety hazards and the steps to avoid or minimise them are identified.</p> <p>c A trial experiment may be carried out.</p>	0–2 marks
	<p>a There is a plan for the investigation, with some explanation of the selection of apparatus and methods. There are some details of how variables are to be controlled, manipulated or taken into account and how relevant observations are to be made.</p> <p>b Most potential safety hazards, and the steps to avoid or minimise them, are identified.</p> <p>c A trial experiment is performed that has some bearing on the planning of the project.</p>	3–6 marks
	<p>a There is a clear plan of action, both for an initial trial phase and for the main period of data collection. Apparatus selected and methods chosen are appropriate to the investigation. There is discussion about how variables are controlled, manipulated or taken into account and about the collection of relevant observations or data.</p> <p>b All potential safety hazards are identified, and suitable steps taken to avoid or minimise them.</p> <p>c A well-thought out trial is conducted in advance of the main data collection phase, and is used to inform the planning of the investigation.</p>	7–9 marks
	<p>a, b, c) There is evidence of thought and ingenuity in the design of experiments or the recording of data, with good attention to detail including the way in which variables are controlled, manipulated or taken into account and how relevant observations are made or data collected. Apparatus is devised or modified to suit the project as necessary.</p>	10–11 marks

Assessment criteria	Level of response	Mark range
Observing and recording	a Some appropriate measurements and observations are recorded, which are adequate for the method used and reasonably accurate. b There is some repeating or checking of values obtained.	0–2 marks
	a Measurements and observations are recorded methodically and accurately in appropriate units, and some thought is given to precision and repeatability. b A reasonable number and range of observations and measurements are carried out. Any anomalous results are noted. There is some appropriate modification of procedures for data collection if necessary.	3–6 marks
	a Observations and measurements are carried out over a suitable range of values or conditions. Sufficient observations and measurements are made to allow a conclusion. Numerical results are recorded to an appropriate degree of precision. b Measurements and observations are repeated as appropriate. Any anomalous results are noted and investigated. If problems arise in the making of measurements or observations, procedures are adapted to ensure data is reliable.	7–8 marks
Interpreting and evaluation	a There is some data processing. Statistical analysis is only completed with detailed guidance. Application of calculated statistical values is present, though limited or confused. b There is an attempt to apply biological principles. c Some conclusions are stated. There is some awareness of the limitations of experimental results and conclusions.	0–3 marks
	a Data is processed with some thought as to choice of method. The chosen statistical test(s) may be inappropriate or provide limited analysis of the stated hypothesis. Calculations are clearly set out but the interpretation of calculated values lacks detailed explanation. Some trends and patterns are identified. b Some attempt is made to interpret results using biological principles, and to draw conclusions based on experimental results. c Conclusions are supported by results. The limitations of results, and conclusions based upon them, are recognised. Any limitations of methods are recognised.	4–6 marks
	a Data are processed using appropriate methods that reveal trends and patterns. The chosen statistical tests are appropriate to the data to be analysed and the hypothesis to be tested. Calculations of statistical tests are clearly set out and interpreted, using a null hypothesis and 5 per cent confidence levels where appropriate. Trends and patterns are identified. b Results are interpreted using biological principles and concepts of Advanced GCE standard. Relevant biological principles are applied correctly throughout. c Conclusions are supported by results. The limitations of results, and conclusions based upon them, are recognised and evaluated. Any limitations of the procedure are commented upon, and sensible modifications suggested.	7–9 marks

Assessment criteria	Level of response	Mark range
Communicating	<p>a The layout of the report largely conforms to that expected of a scientific paper. The organisation of the report produced shows evidence of some thought and the aim of the investigation is stated. Images, when used, are relevant to the points made.</p> <p>b Data is presented in graphs, tables or diagrams, which are mostly appropriate and follow scientific conventions for presentation.</p> <p>c Spelling, punctuation and grammar are generally correct, some technical terms are used appropriately and most sources used are acknowledged in a bibliography.</p> <p>d Sources include at least one professional scientific journal.</p>	0–2 marks
	<p>a The layout of the report mostly conforms to that expected of a scientific paper with subheadings used effectively. The aim(s) and conclusion(s) of the investigation are stated. Images, when used, illustrate points clearly.</p> <p>b Data is presented in well-chosen graphs, tables or diagrams, which usually follow scientific conventions and mostly use SI units, where appropriate, correctly.</p> <p>c Spelling, punctuation and grammar are correct, appropriate technical terms are used throughout. Sources are selected and used appropriately and are correctly and clearly referenced within a properly constructed bibliography.</p> <p>d There is some discussion of the credibility of sources used.</p>	3–4 marks
	<p>a The layout of the report conforms to that expected of a scientific paper with appropriate and helpful subheadings. The organisation of the report shows evidence of thoughtful planning and the aim(s) and conclusion(s) of the project are clearly stated and discussed. Images illustrate the points effectively and enhance the clarity of the report.</p> <p>b Data is presented effectively in graphs, tables or diagrams that follow scientific conventions and are clearly and accurately labelled using SI units where appropriate.</p> <p>c Spelling, punctuation and grammar are correct, and appropriate technical terms are used throughout.</p> <p>d Sources used are evaluated with reference to their credibility within the wider scientific community.</p>	5–6 marks
TOTAL NUMBER OF MARKS AVAILABLE		45

How BioChem Tuition prepares their students for Unit 6BI06: Practical *Biology and Investigative skills?*

Written Report

The report will broadly cover the following topics:

1. **Research and Rationale-** (Rational for the choice of investigation)
2. **Planning-** (Design of experiments/recording of the data with careful attention to variables, observation made. Modification of the apparatus to suit the investigation e.g. Use of quarter meter or 1 meter quadrat while carrying out investigation)
3. **Observing and recording-** (Sufficient sample data to draw conclusion and data obtained to appropriate degree of precision)
4. **Interpreting and evaluation-** (Statistical tests to reflect the hypothesis and finding trends and patterns in the data. Conclusions supported by the data and limitations of methods analysed)
5. **Communicating-** (Layout of the report matches scientific paper, aims and objective clearly stated, images to illustrate the points, presentation of data in graphs, tables and diagrams. Ensure that spelling, punctuation and grammar are correct and evaluation of the scientific references)

BioChem has sourced exemplar materials of 6BI06 and prepared a step-by-step guide for students to follow to ensure that the assessment criteria are fully met. We have copies of our student's work, which have been marked 'grade A'. Although confidential, we can draw on the experience of these reports to help students in 6CH06. Alongside, the feedback provided by examiners on the coursework is looked into thoroughly to ensure that the mistakes are avoided.

Key Features:

- ✓ Step-by-step guide to a word-processed report.
- ✓ Provision of exemplar materials.
- ✓ Feedback on the written report and amendments to ensure that the assessment criteria is fully met.
- ✓ Experience of our 3 reports marked grade A and one grade A*.

A1. Will the use of chlorophyll preserve bananas in food preservation?

A. Designing a data collection strategy

A2. Experimental Hypothesis:

There will be a greater level of yellow seen with an increase in concentration of chlorophyll than without chlorophyll. This will produce a direct linear relationship dependent on the concentration of chlorophyll. There will be a decrease in the level of browning seen with the presence of chlorophyll than without and this will produce an indirect linear relationship. With 100% chlorophyll solution no browning will be seen. With 50% chlorophyll solution 50% browning will be seen.

Null Hypothesis:

There will be no significant relationship between yellowing or browning on the peel and the concentration of chlorophyll added.

A3, A4. Scientific knowledge to understand the need to increase effective food production and minimise waste as a result of spoilage and how this project will investigate one practice of preservation in food production using chlorophyll

The aim of this experiment is to investigate the effect of increasing the concentration of chlorophyll on the longevity of bananas. A large amount of fruit are thrown away each year due to spoilage and alongside an increasing world population and shortage of food and changing climate this is not a sustainable practice. Natural ways of food preservation may be better than G.M.O and U.V irradiation which is not a protocol used in Europe. Current procedures (within Europe) include the use of Shellac, ammonia, polyethylene in food preservation (1). However, washing and coating with chlorophyll instead of the use of ammonia or alongside the use of all the above should preserve the fruit in a non toxic way. It also may be used as a spray in shops to preserve food (as a dry or wet spray).

Maintenance of the green colour in banana peel postharvest is required to obtain premium prices. The U.K. banana industry as a whole is worth around £580 million pounds according to the Fair trade Foundation and new ways to preserve bananas are being sought after due to the extreme economic benefit, biological interest and horticultural importance. It also prevents spoilage to provide effective food production for an ever increasing population using naturally occurring chlorophyll. Since chlorophyll is natural it can be produced an ethically way to increase longevity (1,2, 4).

Student 'X' – The written report submitted in 2013-14-examination cycle that earned grade A for the student.