

Sample Teaching Plan  
Unit G627: Investigating the Scientist's Work

**Suggested teaching time**

Plan is based on 12 weeks at 5 hours per week (4 hours contact time + 1 hour directed study).

The learning activities are suggestions only. Teachers may wish to develop alternative strategies. The plan should be read alongside the G627 Specification and, in particular, the Assessment Evidence Grid (attached for your reference).

| Week number | Specification Unit Reference and Assessment Objectives   | Suggested Learning Activities  | Resources  |
|-------------|--|--|--|
| 1           | <b>3.8.1:</b> Planning an investigation - <b>AO1</b><br>Research.<br>Aim.<br>Identify sources.<br>Consider any ethical implications. | <ul style="list-style-type: none"> <li>• Teacher-led discussion of work done at AS Level.</li> <li>• Discussion on sources of information and validity.</li> <li>• Necessity to record all sources with full details.</li> <li>• Suggest choose a topic (eg aspirin), and then ask a question               <ul style="list-style-type: none"> <li>- eg how can it be prepared/what is it used for?</li> <li>- base the aim of the investigation on this question.</li> </ul> </li> <li>• Students begin research on their own investigation and make sure information found is recorded.</li> </ul> | <b>Online resources:</b><br><a href="http://www.beep.ac.uk">www.beep.ac.uk</a> (validity etc within this resource and much more).<br><a href="http://www.peep.ac.uk">www.peep.ac.uk</a><br><a href="http://www.cheep.ac.uk">www.cheep.ac.uk</a> (online later 2010).<br><a href="http://www.practicalchemistry.org/">www.practicalchemistry.org/</a><br>- useful practical details<br><a href="http://www.rsc.org/education/teachers">www.rsc.org/education/teachers</a><br>- video clips for practical techniques<br>- databases for properties of elements/spectra etc.<br><a href="http://hlsweb.dmu.ac.uk/ahs/elearning/RITA/Resources.html">http://hlsweb.dmu.ac.uk/ahs/elearning/RITA/Resources.html</a><br>- can be used as a resource for microscope work – extending from G623.<br><a href="http://www.practicalbiology.org/">www.practicalbiology.org/</a><br>- useful practical details.<br><a href="http://www.gct.org.uk">www.gct.org.uk</a><br>- for extension work on environment.<br><a href="http://www.practicalphysics.org/">www.practicalphysics.org/</a><br>- useful practical details. |

| Week number | Specification Unit Reference and Assessment Objectives   | Suggested Learning Activities  | Resources   |
|-------------|--|--|---|
|             |  |  | <ul style="list-style-type: none"> <li>• Previous coursework/practical experiments used in AS.</li> <li>• Literature provided by industry and other institutions.</li> </ul>  |
| 2           | <b>Research for practical techniques</b><br>Risk assessments.<br>Identify experimental techniques.   | <ul style="list-style-type: none"> <li>• Teacher-led review of practical techniques both quantitative and qualitative used in AS biology/chemistry/physics experiments.</li> <li>• Include accuracy of apparatus.</li> <li>• Students research and record possible practical techniques for their investigations for more than one method found.</li> <li>• Limitations in use of some techniques recorded.</li> <li>• Selection of techniques recorded.</li> <li>• Method(s) written up.</li> </ul> | <ul style="list-style-type: none"> <li>• Practical reference books.</li> <li>• Internet – see resources listed above.</li> <li>• (B.S.I. website).</li> <li>• Previous work.</li> <li>• Textbooks (eg Salter's approach text books).</li> </ul> |
| 3           | <b>3.8.1: Planning an investigation</b>  | <ul style="list-style-type: none"> <li>• Students draw up own plan.</li> <li>• Plan submitted for provisional grading.</li> <li>• Students order equipment.</li> <li>• Difficulties recorded, including any ethical ones.</li> </ul>   | <ul style="list-style-type: none"> <li>• Access to lab technicians.</li> <li>• Work done for Unit G623 discussed (where applicable).</li> </ul>   |
|             | <b>Check that candidates have:</b> <ul style="list-style-type: none"> <li>• completed requirements for <b>AO1(a) &amp; (b)</b></li> <li>• produced a workable and clearly presented plan to include aims and objectives, details of experimental work, time guidelines, and constraints with documented evidence of research.</li> </ul> |  |   |

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| 4 – 8<br><br>are for actual<br>experimental<br>work | 3.8.2: Carrying out the Investigation<br>Trial of practical techniques.   | <ul style="list-style-type: none"> <li>• First rough attempt at practical work to discover problems etc.</li> <li>• Write up of practical including problems and solutions recorded.</li> <li>• Risk assessment included.</li> </ul>              | <ul style="list-style-type: none"> <li>• Laboratory equipment.</li> </ul>  |
|   | 3.8.2: Carrying out the Investigation<br>Main investigation.<br>Obtaining primary data.<br>Make any changes as required.<br>Work to deadlines set.  | <ul style="list-style-type: none"> <li>• Investigation carried out using as many techniques as possible.</li> <li>• Results recorded, written up in appropriate format and to appropriate accuracy.</li> </ul>                                    | <ul style="list-style-type: none"> <li>• Laboratory equipment.</li> </ul>  |
|   | 3.8.2: Carrying out the Investigation<br>Data review.<br>Identify need to repeat/collect additional data.   | <ul style="list-style-type: none"> <li>• Evaluation of accuracy and reliability of data.</li> <li>• Identification of additional data needed.</li> <li>• Review of range of samples tested.</li> <li>• Comparison with secondary data.</li> </ul> | <ul style="list-style-type: none"> <li>• Data books.</li> <li>• Reference books.</li> <li>• Internet.</li> </ul> |
|   | <b>Check candidates are</b> monitoring their plan as they complete their work giving changes with reasons as appropriate - <b>AO2(a)</b><br><b>Check that you are</b> collecting evidence for <b>AO3(a)</b> that the investigation is being implemented safely.   |   |  |
|   | 3.8.3: Processing and Presentation of data from Investigation<br>Processing data/errors.  | <ul style="list-style-type: none"> <li>• Teacher-led discussion on errors.</li> <li>• Data processed and errors calculated.</li> </ul>  | <ul style="list-style-type: none"> <li>• Reference books.</li> </ul>   |
|   | 3.8.3 Processing and Presentation of data from Investigation  | <ul style="list-style-type: none"> <li>• Discussion on ways in which results can be presented.</li> <li>• Use of graphs.</li> <li>• Results presented in suitable way.</li> </ul>   |  |
|   | <b>Check that candidates:</b> <ul style="list-style-type: none"> <li>• have opportunities from the results of their experimental work to carry out calculations - <b>AO2(c)</b></li> <li>• are recording results in a suitable format AO3c and processing and interpreting data. - <b>AO3(d)</b></li> </ul> |   |  |

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|----|---|--|--|
| 9  | 3.8.4: Evaluation of Investigation  | <ul style="list-style-type: none"> <li>• Conclusions are drawn.</li> <li>• Sources of errors indentified.</li> <li>• Critical evaluation of method(s) used.</li> </ul> |  |
| 10 | Review of investigation   | <ul style="list-style-type: none"> <li>• Students discuss the reliability of their investigation and how well it achieved its aims.</li> </ul>                         |  |
|    | <b>Check that candidates</b> are recording the reliability and outcomes of the investigation and how it achieved its aims - <b>AO2(b)</b>   |  |  |
| 11 | 3.8.5: Presentation of the Outcomes of the Investigation  | <ul style="list-style-type: none"> <li>• Outcomes written up.</li> </ul>   |  |
| 12 | 3.8.5: Presentation of the Outcomes of the Investigation  | <ul style="list-style-type: none"> <li>• Evaluation of the investigation completed.</li> </ul>   |  |
|    | <b>Check that candidates:</b> <ul style="list-style-type: none"> <li>• produce an evaluative scientific report to cover requirements - <b>AO3(b) &amp; (e)</b></li> <li>• check spelling, punctuation and grammar.</li> </ul> |  |  |

## Unit G627 - Assessment Evidence Grid

| Unit G627: Investigating the Scientist's Work  |   |   |   |              |
|--|---|---|---|--------------|
| What the candidate needs to do:  |   |   |   |              |
| <p><b>The candidate needs to produce</b> an information pack, which can be used and understood by a group of scientific research technicians [50 marks].</p> <p>This evidence needs to include:</p> <p><b>AO1:</b> a detailed and workable plan for <b>one</b> scientific vocational investigation, to include aims and objectives, full details of experimental work, and constraints under which the candidate will need to work, with documented evidence of research [10];</p> <p><b>AO2:</b> evidence showing the tracking and understanding of the outcomes of the investigation with evidence that data collected has been processed and interpreted [14];</p> <p><b>AO3:</b> evidence to show the investigation was implemented safely and produce an evaluative scientific report on the outcomes of the investigation suitable for the technicians to understand and use [26].</p> |   |   |   |              |
| How the candidate will be assessed:  |   |   |   |              |
| Assessment Objective   | Mark Band 1   | Mark Band 2   | Mark Band 3   | Mark Awarded |
| AO1  | Candidate will produce a workable and clearly presented plan for <b>one</b> investigation linked to a vocational context; the plan shows <ul style="list-style-type: none"> <li>the aims and objectives</li> <li>a basic knowledge of the scientific principles</li> <li>experimental techniques to be used</li> <li>timing for activities</li> <li>information on deadlines candidate will need to be aware of;</li> </ul> <p style="text-align: right;">[0 1 2]</p> | candidate will produce an achievable and logically presented plan, for <b>one</b> investigation with direct vocational involvement which shows <ul style="list-style-type: none"> <li>a sound knowledge and understanding of the aims and objectives set</li> <li>a range of experimental techniques which will be used</li> <li>appropriate detailed time information for all activities</li> <li>identification of constraints candidate will have to work under and how they can be overcome;</li> </ul> <p style="text-align: right;">[3]</p> | candidate will produce a comprehensive, realistic, achievable and logically presented plan for <b>one</b> suitable investigation which demonstrates <ul style="list-style-type: none"> <li>a thorough knowledge and understanding of the objectives</li> <li>a wide range of experimental techniques, which will be used</li> <li>appropriate workable time guidelines</li> <li>identification and discussion of the constraints, their effect and suitable contingency plans.</li> </ul> <p style="text-align: right;">[4 5]</p> |              |
|  | Candidate will show evidence of selected research about an investigation to include <ul style="list-style-type: none"> <li>vocational links</li> <li>suitable experimental work</li> <li>health and safety guidance</li> <li>referencing of sources used;</li> </ul> <p style="text-align: right;">[0 1 2]</p>  | candidate will show evidence of a wide range of relevant research, selected from a number of sources about an investigation to include <ul style="list-style-type: none"> <li>relevant vocational links</li> <li>a range of experimental work</li> <li>related health and safety guidance</li> <li>related referencing of sources;</li> </ul> <p style="text-align: right;">[3]</p>   | candidate will show evidence of thorough research and suitable selection of information from a wide range of sources, about an investigation to include <ul style="list-style-type: none"> <li>researched vocational links</li> <li>a wide range of experimental work</li> <li>detailed and relevant health and safety guidance</li> <li>suitable referencing and validation of sources used.</li> </ul> <p style="text-align: right;">[4 5]</p>  |              |
|  |   |   |   | /10          |

| <b>G627: Investigating the Scientist's Work (continued)</b> |  |  |  |                     |
|---|--|--|--|---------------------|
| <b>Assessment Objective</b>                                 | <b>Mark Band 1</b>   | <b>Mark Band 2</b>   | <b>Mark Band 3</b>   | <b>Mark Awarded</b> |
| <b>AO2</b>  | Candidate will produce a record of monitoring their plan with reasons showing how the plan has been followed;<br><div>[0 1 2]</div>      | candidate will show evidence of monitoring their plan, how the plan has been followed and include any modifications or changes needed to be made, providing reasons for the changes;<br><div>[3]</div> | candidate will show detailed evidence of monitoring their plan and will carry out and provide explanations of any strategies used to overcome any deficiencies or constraints of the plan.<br><div>[4]</div> |                     |
|   | Candidate will interpret the outcomes of the investigation and discuss its success;<br><div>[0 1]</div>                                  | candidate will assess the reliability of the outcomes and the data and discuss how well the investigation achieved its aims;<br><div>[2 3]</div>   | candidate will discuss the reliability of the investigation with a detailed scientific discussion of how the investigation achieved its aims and objectives.<br><div>[4 5]</div>                             |                     |
|   | Candidate will carry out a number of completed straightforward calculations which are linked to the investigation;<br><div>[0 1 2]</div> | candidate will carry out a number of straightforward and complex calculations completed with partial success and accuracy which are linked to the investigation;<br><div>[3]</div>                     | candidate will accurately and correctly complete a number of complex calculations which are linked to the investigation, giving answers to the correct number of significant figures.<br><div>[4 5]</div>    |                     |
|   |  |  |  | <b>/14</b>          |

| G627: Investigating the scientist's work (continued) |  |  |   |              |
|--|--|--|---|--------------|
| Assessment Objective                                 | Mark Band 1  | Mark Band 2  | Mark Band 3   | Mark Awarded |
| AO3  | Candidate will provide evidence that the experimental procedures or trials in the investigation have been carried out safely and correctly and repeated where necessary using risk assessments;<br><div>[0 1 2]</div>  | candidate will show evidence that a range of experimental techniques and procedures has been safely and skilfully completed using suitably detailed risk assessments and within the constraints of the plan;<br>candidate will demonstrate that an appropriate degree of accuracy has been used;<br><div>[3 4]</div>                                       | candidate will show evidence that a wide range of experimental techniques and procedures has been safely, skilfully, accurately and independently completed, using detailed risk assessments which they have produced.<br><div>[5 6]</div>  |              |
|  | Candidate will produce a clear and accurate report of the outcomes of the investigation, using basic scientific terminology correctly, which can be understood by research technicians with evidence of corrected spelling, punctuation and grammar;<br><div>[0 1 2]</div> | candidate will produce a logical and accurate report of the outcomes of the investigation, using scientific terminology correctly, with correct punctuation and grammar, which can be understood and used by research technicians; there is evidence to show understanding of the scientific concepts involved in the investigation;<br><div>[3 4 5]</div> | candidate will produce a logical and well-structured report of the outcomes of the investigation using all the appropriate scientific terminology, with correct spelling, punctuation and grammar suitable for use by scientific technicians; this will show a high level of scientific knowledge and understanding relevant to the investigation and its applied implications.<br><div>[6 7]</div> |              |
|  | Candidate will record the results of the investigation and present them in a suitable format;<br><div>[0 1]</div>  | candidate will accurately record results and outcomes of the investigation and present them in a suitable format including a suitable description and explanation;<br><div>[2 3]</div>   | candidate will accurately record to the appropriate precision and present results of the investigation in a suitable manner and provide a detailed explanation.<br><div>[4]</div>   |              |
|  | Candidate will show processing and interpretation of the data collected with a suitable link to the vocational context set;<br><div>[0 1 2]</div>  | candidate will show suitable accurate processing and interpretation of the data collected, relating to the objectives of the investigation;<br><div>[3]</div>  | candidate will show evidence that the appropriate method of processing has been selected and accurately and correctly used with any anomalous data identified and evaluated;<br>candidate provides a critical analysis of the results relating to the objectives of the investigation.<br><div>[4 5]</div>  |              |
|  | Candidate will produce a basic evaluation of the investigation;<br><div>[0 1]</div>  | candidate will produce an evaluation of the investigation;<br><div>[2 3]</div>   | candidate will produce a critical evaluation of the investigation, incorporating suitable amendments where appropriate.<br><div>[4]</div>   |              |
| Total mark awarded:                                  |  |  |   | /26<br>/50   |