



Science Stage 6

Skills Module 8.1 and 9.1 Mapping Grids

Templates for the mapping of the skills content Modules 8.1 and 9.1 have been provided to assist teachers in evaluating existing, and planning new, teaching-learning programs for the Stage 6 Biology, Chemistry, Earth and Environmental Science, Physics and Senior Science syllabuses (approved June 1999; amended October 2002).

Module 8.1 Skills Content	MODULES			
<i>Students:</i>	8.2	8.3	8.4	8.5
11.1 identify data sources to:				
a) analyse complex problems to determine appropriate ways in which each aspect may be researched.				
b) determine the type of data that needs to be collected and explain the qualitative or quantitative analysis that will be required for this data to be useful				
c) identify the orders of magnitude that will be appropriate and the uncertainty that may be present in the measurement of data				
d) identify and use correct units for data that will be collected				
e) recommend the use of an appropriate technology or strategy for data collection or gathering information that will assist efficient future analysis				
11.2 plan first-hand investigations to:				
a) demonstrate the use of the terms 'dependent' and 'independent' to describe variables involved in the investigation				
b) identify variables that need to be kept constant, develop strategies to ensure that these variables are kept constant and demonstrate the use of a control				
c) design investigations that allow valid and reliable data and information to be collected				
d) describe and trial procedures to undertake investigations and explain why a procedure, a sequence of procedures or the repetition of procedures is appropriate				
e) predict possible issues that may arise during the course of an investigation and identify strategies to address these issues if necessary				
11.3 choose equipment or resources by:				
a) identifying and/or setting up the most appropriate equipment or combination of equipment needed to undertake an investigation				
b) carrying out a risk assessment of intended experimental procedures and identifying and addressing potential hazards				
c) identifying technology that could be used during investigations and determining its suitability and effectiveness for its potential role in the procedure or investigations				
d) recognising the difference between destructive and non-destructive testing of material and analysing potentially different results of these two procedures				
12.1 perform first-hand investigations by:				
a) carrying out the planned procedure, recognising where and when modifications are needed and analysing the effect of these adjustments				
b) efficiently undertaking the planned procedure to minimise hazards and wastage of resources				
c) disposing of any waste materials produced carefully and safely during the investigation				
d) identifying and using safe work practices during investigations				
12.2 gather first-hand information by:				
a) using appropriate data collection techniques, employing appropriate technologies including data loggers and sensors				
b) measuring, observing and recording results in accessible and recognisable forms, carrying out repeat trials as appropriate				

<p>12.3 gather information from secondary sources by:</p> <p>a) accessing information from a range of resources including popular scientific journals, digital technologies and the internet</p> <p>b) practising efficient data collection techniques to identify useful information in secondary sources</p> <p>c) extracting information from numerical data in graphs and tables as well as from written and spoken material in all its forms</p> <p>d) summarising and collating information from a range of resources</p> <p>e) identifying practising male and female Australian scientists, the areas in which they are currently working and information about their research</p>				
<p>12.4 process information to:</p> <p>a) assess the accuracy of any measurements and calculations and the relative importance of the data and information gathered</p> <p>b) identify and apply appropriate mathematical formulae and concepts</p> <p>c) best illustrate trends and patterns by selecting and using appropriate methods, including computer-assisted analysis</p> <p>d) evaluate the *relevance/validity of first-hand and secondary information and data in relation to the area of investigation</p> <p>e) assess the reliability of first-hand and secondary information and data by considering information from various sources</p> <p>f) assess the accuracy of scientific information presented in mass media by comparison with similar information presented in scientific journals</p>				
<p>13.1 present information by:</p> <p>a) selecting and using appropriate text types or combinations thereof, for oral and written presentations</p> <p>b) selecting and using appropriate media to present data and information</p> <p>c) selecting and using appropriate formats to acknowledge sources of information</p> <p>d) using symbols and formulae to express relationships and using appropriate units for physical quantities</p> <p>e) using a variety of pictorial representations to show relationships and presenting information clearly and succinctly</p> <p>f) selecting and drawing appropriate graphs to convey information and relationships clearly and accurately</p> <p>g) identifying situations where use of a curve of best fit is appropriate to present graphical information</p>				
<p>14.1 analyse information to:</p> <p>a) identify trends, patterns and relationships as well as contradictions in data and information</p> <p>b) justify inferences and conclusions</p> <p>c) identify and explain how data supports or refutes an hypothesis, a prediction or a proposed solution to a problem</p> <p>d) predict outcomes and generate plausible explanations related to the observations</p> <p>e) make and justify generalisations</p> <p>f) use models, including mathematical ones, to explain phenomena and/or make predictions</p> <p>g) use cause and effect relationships to explain phenomena</p> <p>h) identify examples of the interconnectedness of ideas or scientific principles</p>				
<p>14.2 solve problems by:</p> <p>a) identifying and explaining the nature of a problem</p> <p>b) describing and selecting from different strategies those which could be used to solve a problem</p> <p>c) using identified strategies to develop a range of possible solutions to a particular problem</p> <p>d) evaluating the appropriateness of different strategies for solving an identified problem</p>				
<p>14.3 use available evidence to:</p> <p>a) design and produce creative solutions to problems</p> <p>b) propose ideas that demonstrate coherence and logical progression and include correct use of scientific principles and ideas</p> <p>c) apply critical thinking in the consideration of predictions, hypotheses and the results of investigations</p> <p>d) formulate cause and effect relationships</p>				

* For Stage 6 Biology and Chemistry

Module 9.1 Skills Content	MODULES			
<i>Students:</i>	9.2	9.3	9.4	
11.1 identify data sources to: a) analyse complex problems to determine appropriate ways in which each aspect may be researched b) determine the type of data that needs to be collected and explain the qualitative or quantitative analysis that will be required for this data to be useful c) identify the orders of magnitude that will be appropriate and the uncertainty that may be present in the measurement of data d) identify and use correct units for data that will be collected e) recommend the use of an appropriate technology or strategy for data collection or gathering information that will assist efficient future analysis				
11.2 plan first-hand investigations to: a) demonstrate the use of the terms 'dependent' and 'independent' to describe variables involved in the investigation b) identify variables that need to be kept constant, develop strategies to ensure that these variables are kept constant and demonstrate the use of a control c) design investigations that allow valid and reliable data and information to be collected d) describe and trial procedures to undertake investigations and explain why a procedure, a sequence of procedures or the repetition of procedures is appropriate e) predict possible issues that may arise during the course of an investigation and identify strategies to address these issues if necessary				
11.3 choose equipment or resources by: a) identifying and/or setting up the most appropriate equipment or combination of equipment needed to undertake an investigation b) carrying out a risk assessment of intended experimental procedures and identifying and addressing potential hazards c) identifying technology that could be used during investigations and determining its suitability and effectiveness for its potential role in the procedure or investigations d) recognising the difference between destructive and non-destructive testing of material and analysing potentially different results of these two procedures				
12.1 perform first-hand investigations by: a) carrying out the planned procedure, recognising where and when modifications are needed and analysing the effect of these adjustments b) efficiently undertaking the planned procedure to minimise hazards and wastage of resources c) disposing of any waste materials produced carefully and safely during the investigation d) identifying and using safe work practices during investigations				
12.2 gather first-hand information by: a) using appropriate data collection techniques, employing appropriate technologies including data loggers and sensors b) measuring, observing and recording results in accessible and recognisable forms, carrying out repeat trials as appropriate				

<p>12.3 gather information from secondary sources by:</p> <p>a) accessing information from a range of resources including popular scientific journals, digital technologies and the internet</p> <p>b) practising efficient data collection techniques to identify useful information in secondary sources</p> <p>c) extracting information from numerical data in graphs and tables as well as from written and spoken material in all its forms</p> <p>d) summarising and collating information from a range of resources</p> <p>e) identifying practising male and female Australian scientists, the areas in which they are currently working and information about their research</p>				
<p>12.4 process information to:</p> <p>a) assess the accuracy of any measurements and calculations and the relative importance of the data and information gathered</p> <p>b) identify and apply appropriate mathematical formulae and concepts</p> <p>c) best illustrate trends and patterns by selecting and using appropriate methods, including computer-assisted analysis</p> <p>d) evaluate the *relevance/validity of first-hand and secondary information and data in relation to the area of investigation</p> <p>e) assess the reliability of first-hand and secondary information and data by considering information from various sources</p> <p>f) assess the accuracy of scientific information presented in mass media by comparison with similar information presented in scientific journals</p>				
<p>13.1 present information by:</p> <p>a) selecting and using appropriate text types or combinations thereof, for oral and written presentations</p> <p>b) selecting and using appropriate media to present data and information</p> <p>c) selecting and using appropriate methods to acknowledge sources of information</p> <p>d) using symbols and formulae to express relationships and using appropriate units for physical quantities</p> <p>e) using a variety of pictorial representations to show relationships and present information clearly and succinctly</p> <p>f) selecting and drawing appropriate graphs to convey information and relationships clearly and accurately</p> <p>g) identifying situations where use of a curve of best fit is appropriate to present graphical information</p>				
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