Mapping of VCE Environmental Science assessment tasks against key science skills

The VCE Environmental Science Performance Descriptors enable teachers to assess key knowledge and key science skills across Units 3 and 4. The table below provides a planning template for teachers to map the contextualised key science skills for VCE Environmental Science across Units 3 and 4 to ensure that the VCE assessment principle of balance is achieved. Only one task can be selected for each outcome. Teachers have the flexibility to adapt the performance descriptors to suit their own school contexts.

| **Key science skill** | **VCE Environmental Science Units 3–4** | **Task 1** | **Task 2** | **Task 3** | **Task 4** | **U4 AoS3 Scientific poster** |
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| Develop aims and questions, formulate hypotheses and make predictions | * identify, research and construct aims and questions for investigation |  |  |  |  |  |
| * identify independent, dependent and controlled variables in controlled experiments |  |  |  |  |  |
| * formulate hypotheses to focus investigations |  |  |  |  |  |
| * predict possible outcomes of investigations |  |  |  |  |  |
| Plan and conduct investigations | * determine appropriate investigation methodology: case study; classification and identification; controlled experiment; correlational study; fieldwork; literature review; modelling; product, process or system development; simulation |  |  |  |  |  |
| * design and conduct investigations: select and use methods appropriate to the selected investigation methodology, including consideration of sampling technique and size, equipment and procedures, taking into account potential sources of error and uncertainty; determine the type and amount of qualitative and/or quantitative data to be generated or collated |  |  |  |  |  |
| * select appropriate sampling techniques in fieldwork (including grids, quadrats, transects and mark-recapture) |  |  |  |  |  |
| * explain the effects of varying sample sizes in obtaining robust data |  |  |  |  |  |
| * work independently and collaboratively as appropriate and within identified research constraints, adapting or extending processes as required and recording such modifications |  |  |  |  |  |
| Comply with safety and ethical guidelines | * demonstrate safe laboratory practices when planning and conducting investigations by using risk assessments that are informed by safety data sheets (SDS), and accounting for risks |  |  |  |  |  |
| * apply relevant occupational health and safety guidelines while undertaking practical investigations |  |  |  |  |  |
| * demonstrate ethical conduct when undertaking and reporting investigations |  |  |  |  |  |
| Generate, collate and record data | * systematically generate and record primary data, and collate secondary data, appropriate to the investigation, including use of databases and reputable online data sources |  |  |  |  |  |
| * record and summarise both qualitative and quantitative data, including use of a logbook as an authentication of generated or collated data |  |  |  |  |  |
| * organise and present data in useful and meaningful ways, including schematic diagrams, flow charts, tables, bar charts and line graphs |  |  |  |  |  |
| Analyse and evaluate data and investigation methods | * process quantitative data using appropriate mathematical relationships and units, including calculations of ratios, percentages, percentage change and mean |  |  |  |  |  |
| * extrapolate and interpolate data points from graphs |  |  |  |  |  |
| * identify and analyse experimental data qualitatively, handling, where appropriate, concepts of: accuracy, precision, repeatability, reproducibility and validity of measurements; errors (random and systematic); and degree of confidence and certainty in data, including confidence ratings of climate projections |  |  |  |  |  |
| * identify outliers, and contradictory, provisional or incomplete data |  |  |  |  |  |
| * repeat experiments to ensure findings are robust |  |  |  |  |  |
| * process and analyse data to identify cause-and-effect relationships, correlations, and linear, non-linear or cyclical patterns |  |  |  |  |  |
| * evaluate investigation methods and possible sources of error, and suggest improvements to increase accuracy and precision, and to reduce the likelihood of errors |  |  |  |  |  |
| Construct evidence-based arguments and draw conclusions | * distinguish between opinion, anecdote and evidence (including weak and strong evidence), and scientific and non-scientific ideas |  |  |  |  |  |
| * evaluate data to determine the degree to which the evidence supports the aim of the investigation, and make recommendations, as appropriate, for modifying or extending the investigation |  |  |  |  |  |
| * evaluate data to determine the degree to which the evidence supports or refutes the initial prediction or hypothesis |  |  |  |  |  |
| * use reasoning to construct scientific arguments, and to draw and justify conclusions consistent with evidence and relevant to the question under investigation |  |  |  |  |  |
| * identify, describe and explain the limitations of conclusions, including identification of further evidence required |  |  |  |  |  |
| * discuss the implications of research findings and proposals |  |  |  |  |  |
| Analyse, evaluate and communicate scientific ideas | * use appropriate environmental science terminology, representations and conventions, including standard abbreviations, graphing conventions and units of measurement |  |  |  |  |  |
| * discuss relevant environmental science information, ideas, concepts, theories and models and the connections between them |  |  |  |  |  |
| * analyse and explain how models and theories are used to organise and understand observed phenomena and concepts related to environmental science, identifying limitations of selected models/theories |  |  |  |  |  |
| * critically evaluate and interpret a range of scientific and media texts (including journal articles, mass media communications and opinions in the public domain), processes, claims and conclusions related to environmental science by considering the quality of available evidence |  |  |  |  |  |
| * analyse and evaluate environmental science scenarios, case studies, issues and challenges using the sustainability principles of conservation of biodiversity and ecological integrity, efficiency of resource use, intergenerational equity, intragenerational equity, precautionary principle, and user pays principle |  |  |  |  |  |
| * apply Earth systems thinking to analyse and evaluate responses to environmental science scenarios, case studies, issues and challenges in terms of supporting and sustaining ecological integrity |  |  |  |  |  |
| * identify and explain when judgments or decisions associated with issues related to environmental science may be based on sociocultural, economic, political, legal and/or ethical factors and not solely on scientific evidence |  |  |  |  |  |
| * use clear, coherent and concise expression to communicate to specific audiences and for specific purposes in appropriate scientific genres, including scientific reports and posters |  |  |  |  |  |
| * acknowledge sources of information and assistance, and use standard scientific referencing conventions |  |  |  |  |  |