VCE Units 3 and 4 Environmental Science: Performance descriptors

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| **VCE ENVIRONMENTAL SCIENCE****SCHOOL-ASSESSED COURSEWORK** |
| **Assessment task: ‘Communication of the design, analysis and findings of a student-designed and student-conducted scientific investigation through a structured scientific poster and logbook entries’** |
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| ***Unit: 4******Outcome: 3****Design and conduct a scientific investigation related to biodiversity, environmental management, climate change and/or energy use, and present an aim, methodology and method, results, discussion and a conclusion in a scientific poster* |  | **DESCRIPTOR: typical performance in each range** |
| **Key Science Skills** | **Very low**  | **Low** | **Medium** | **High** | **Very high** |
| ***Develop aims and questions, formulate hypotheses and make predictions*** | * Writes a statement about the investigation
* Defines a variable
* Makes a prediction about investigation outcomes.
 | * Formulates an informal hypothesis
* Identifies all variables in the investigation
* Justifies a prediction.
 | * Formulates a general hypothesis
* Distinguishes between different types of variables
* Makes a prediction based on prior experience.
 | * Formulates an ‘if…then’ hypothesis
* Describes how experimental variables have been controlled
* Makes a prediction about investigation outcomes based on scientific understanding.
 | * Formulates an ‘if…then…because’ hypothesis
* Explains the importance of controlling variables
* Supports prediction with background research.
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| ***Plan and conduct investigations*** | * Uses a provided investigation methodology
* Adapts a provided method to suit the investigation.
 | * Identifies an investigation methodology
* Outlines an investigation method.
 | * Explains investigation methodology
* Modifies a proposed investigation based on feedback.
 | * Explains why the choice of methodology is appropriate
* Proposes a viable method to generate primary data.
 | * Discusses possible limitations of choice of methodology
* Applies a relevant method to undertake the investigation.
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| ***Comply with safety and ethical guidelines*** | * Follows provided occupational health and safety guidelines
* Follows risk assessments relevant to the investigation.
 | * Describes the precautions that will be taken in following occupational health and safety
* Uses safety data sheets to determine risks.
 | * Selectsoccupational health and safety guidelines relevant to the investigation
* Develops strategies to manage risks.
 | * Discusses how occupational health and safety guidelines are relevant to the investigation
* Explains how risks have been managed.
 | * Explains risk of not following occupational health and safety guidelines
* Predicts possible scenarios if risks are not well managed.
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| * Works with generated data.
 | * Records all generated data in their logbook, as an ethical practice.
 | * Plots all generated data on a graph, as an ethical practice.
 | * Identifies outliers, as an ethical practice.
 | * Explains how outliers have been treated, as an ethical practice.
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| ***Generate, collate and record data*** | * Records generated primary data in their logbook
* Classifies data as qualitative or quantitative.
 | * Records generated primary data in their logbook using provided tables
* Describes data relevant to their investigation.
 | * Constructs tables to record generated primary data in their logbook
* Identifies data as discrete or continuous.
 | * Organises generated primary data into tables in their logbook
* Explains how data will be analysed to address the investigation question.
 | * Selects relevant generated primary data to include in tables in their logbook
* Discusses the type and amount of data to be generated.
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| ***Analyse and evaluate data and investigation methods*** | * Organises raw data into a table
* States a pattern in the tabled data.
 | * Constructs a representation from tabled data
* Describes a relationship or pattern in the representation.
 | * Follows scientific conventions in constructing a data representation
* Draws a trend line.
 | * Explains the selection of the data representation
* Accounts for outliers in discussing a relationship or pattern in data.
 | * Discusses aspects of the data representation that will be used to draw conclusions
* Applies mathematical skills to evaluate relationships or patterns.
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| * Distinguishes between the investigation methodology and method used in the selected investigation
* Defines accuracy and precision
* Refers to sources of personal error or bias.
 | * States whether the investigation methodology / method led to valid data being generated
* Distinguishes between accuracy and precision in relation to investigation data
* Suggests how personal errors or bias may have been avoided.
 | * Discusses how effectively the investigation methodology / method enabled valid data to be generated
* Explains how repeatability affects precision
* Outlines how errors and bias have been dealt with.
 | * Discusses how effectively the investigation methodology / method enabled a valid conclusion to be drawn
* Compares accuracy, precision repeatability and validity
* Explains how the investigation method could be improved to avoid errors or bias.
 | * Evaluates the strengths and weaknesses of the selected methodology / method used to draw a conclusion
* Analyses accuracy, precision, repeatability and validity
* Determines possible effects of personal errors and bias on the investigation conclusion.
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| ***Construct evidence-based arguments and draw conclusions*** | * States whether the investigation prediction or hypothesis is supported or refuted
* Provides a conclusion
* Identifies a limitation of the conclusion
* States a modification to the investigation.
 | * Refers to data to support or refute the prediction or hypothesis
* Links hypothesis to conclusion
* Describes limitations of conclusions
* Describes how a modification to the method may improve the quality of data.
 | * Links data patterns or relationships to whether the investigation prediction or hypothesis is supported or refuted
* Draws conclusions that respond to the investigation question
* Explains limitations of conclusions
* Analyses the validity of the investigation method.
 | * Analyses data to determine whether the investigation prediction or hypothesis is supported or refuted
* Draws conclusions consistent with the data analysis
* Explains how the limitations of conclusions affect validity
* Proposes a relevant investigation extension.
 | * Evaluates data to explain why the investigation prediction or hypothesis is supported or refuted
* Refers to relevant data analysis to justify conclusions
* Identifies further evidence required to draw a valid conclusion
* Explains the purpose of the investigation extension.
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| ***Analyse, evaluate and communicate scientific ideas*** | * Uses general language to communicate investigation findings
* Uses a provided poster template
* Lists sources of information.
 | * Uses environmental science language to communicate investigation findings
* Adheres to scientific poster conventions
* Lists author, date, and title of each source of information.
 | * Shows consideration of the audience in communicating investigation findings
* Includes relevant information in a scientific poster
* Adheres to standard referencing conventions.
 | * Provides context in responding to the investigation question
* Modifies a poster template to improve the communication cohesion
* Acknowledges relevant sources of information and assistance.
 | * Explains implications of investigation findings
* Modifies poster template to communicate critical investigation information
* Acknowledges credible sources of information and assistance.
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