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. |
| ***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. |
| ***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. |
| * 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. |
| ***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. |
| ***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. |
| * 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. |
| ***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. |
| ***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. |