In this task you will investigate how one factor affects the heat generated by various charcoal fuels to help answer the following question:

Charcoal for barbeques is sold mainly as either lump charcoal or as moulded briquettes. There are many different brands available to the consumer. What’s the best charcoal fuel to use in a home barbeque?

* *Step 1 (in pairs)*

*Deconstruction of the problem.* Research the types of charcoal available by visiting the supermarket or using information from the Internet. List the various factors that differ between these types that might influence the amount of heat generated in a barbeque.

* *Step 2 (individually) IAE1*

Write your deconstruction ideas using a format of your choice.

Select one factor to investigate and design a method to use in the laboratory to compare the heat generated by fuels as this factor varies.

Identify:

* the independent and dependent variables
* the hypothesis
* a method to trial

Carry out a trial. Record your observations and notes about the design and modifications you might make for your actual investigation.

* *Step 3 (individually) IAE1*

Design your own investigation.

* List the independent and dependent variables, factors to be held constant and factors that may not be able to be controlled.
* List the types and quantities of materials required and a detailed procedure.
* Use the results of your trial help write a justification for your design.
* Identify ethical and safety considerations.

Submit your deconstruction, design and justification for teacher feedback. Suggested formats for this evidence include flow charts, concept maps, tables or notes.

* *Step 4 (in pairs) IAE2*

Select, and carry out, one investigation and record your own observations.

* *Step 5 (individually) IAE3, IAE4, KA4*

Write your report, which should include:

* introduction with relevant chemistry concepts, hypothesis and variables
* materials/apparatus\*
* the method that was implemented
* identification and management of safety and/or ethical risks
* results, including table(s) and/or graph(s)
* analysis of results, identifying trends, and linking results to concepts
* evaluation of procedures and their effect on data, and identifying sources of uncertainty
* conclusion, with justification.

The report should be a maximum of 1500 words if written, or a maximum of 10 minutes for an oral presentation, or the equivalent in multimodal form. The sections included in the word count are the introduction, analysis, evaluation and conclusion. Attach your deconstruction evidence to the report.

**Performance Standards for Stage 2 Chemistry**

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| --- | --- | --- | --- | --- | --- | --- |
|  | | **A** | **B** | **C** | **D** | **E** |
| **Investigation, Analysis and Evaluation** | **1**  **2**  **3**  **4** | Critically deconstructs a problem and designs a logical, coherent, and detailed chemistry investigation.  Obtains records, and represents data using appropriate conventions and formats accurately and highly effectively.  Systematically analyses and interprets data and evidence to formulate logical conclusions with detailed justification.  Critically and logically evaluates procedures and their effects on data. | Logically deconstructs a problem and designs a well-considered and clear chemistry investigation.  Obtains, records, and represents data using appropriate conventions and formats mostly accurately and effectively.  Logically analyses and interprets data and evidence to formulate suitable conclusions with reasonable justification.  Logically evaluates procedures and their effects on data. | Deconstructs a problem and designs a considered and generally clear chemistry investigation.  Obtains, records, and represents data using generally appropriate conventions and formats with some errors but generally accurately and effectively.  Undertakes some analysis and interpretation of data and evidence to formulate generally appropriate conclusions with some justification.  Evaluates procedures and some of their effects on data. | Prepares a basic deconstruction of a problem and an outline of a chemistry investigation.  Obtains, records, and represents data using conventions and formats inconsistently, with occasional accuracy and effectiveness.  Describes data and undertakes some basic interpretation to formulate a basic conclusion.  Attempts to evaluate procedures or suggest an effect on data. | Attempts a simple deconstruction of a problem and a procedure for a chemistry investigation.  Attempts to record and represent some data with limited accuracy or effectiveness.  Attempts to describe results and/or interpret data to formulate a basic conclusion.  Acknowledges that procedures affect data. |
| **Knowledge and Application** | **1**  **2**  **3**  **4** | Demonstrates deep and broad knowledge and understanding of a range of chemical concepts.  Applies chemical concepts highly effectively in new and familiar contexts.  Critically explores and understands in depth the interaction between science and society.  Communicates knowledge and understanding of chemistry coherently with highly effective use of appropriate terms, conventions and representations. | Demonstrates some depth and breadth of knowledge and understanding of a range of chemical concepts.  Applies chemical concepts mostly effectively in new and familiar contexts.  Logically explores and understands in some depth the interaction between science and society.  Communicates knowledge and understanding of chemistry mostly coherently with effective use of appropriate terms, conventions, and representations. | Demonstrates knowledge and understanding of a general range of chemical concepts.  Applies chemical concepts generally effectively in new or familiar contexts.  Explores and understands aspects of the interaction between science and society.  Communicates knowledge and understanding of chemistry generally effectively using some appropriate terms, conventions, and representations. | Demonstrates some basic knowledge and partial understanding of chemical concepts.  Applies some chemical concepts in familiar contexts.  Partially explores and recognises aspects of the interaction between science and society.  Communicates basic chemical information, using some appropriate terms, conventions, and/or representations. | Demonstrates some limited recognition and awareness of chemical concepts.  Attempts to apply chemical concepts in familiar contexts.  Attempts to explore and identify an aspect of the interaction between science and society.  Attempts to communicate information about chemistry. |