Stage 2 Physics

Assessment type and task clearly identified.

Assessment Type 1: Investigations Folio

Deconstruction and Design Investigation

Manufacturers of washing machines want efficiency and effectiveness in the spin cycle of machines that they produce. They want to have as short a cycle as possible and have the clothes as dry as possible at the end of the spin cycle.

In this investigation, you will consider the problem that the manufacturer faces when designing a new machine. You will then design and conduct an experiment to determine the effect of *one* factor on the efficiency of spinning clothes dry in a washing machine by modelling and testing it in the laboratory.

Context provided for the investigation.

**A Deconstruct the problem**

* Think about a range of factors to be considered when designing the washing machine with an efficient and effective spin cycle.
* Identify the impact these could have on the construction of the washing machine and the criteria you might use for judging efficiency and effectiveness.

Task is broken down into manageable sections, clearly identifying requirements and timeline of task.

* Consider how these could be tested in the laboratory and how the results could be measured and recorded.
* Summarise your thinking

**B Designing your own investigation**

* Select one factor and develop and justify a method to investigate how that factor might influence the spin cycle of a washing machine.
* Use the guidelines on Page 7 of the subject outline (shown below) to help you design your practical investigation.

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| Design of investigations include:   * hypothesis or inquiry question * types of variables   Requirements from the subject outline highlighted.   * dependent * independent * factors held constant (how and why they are controlled) * factors that may not be able to be controlled (and why not) * materials required * the procedure to be followed * the type and amount of data to be collected * a blank data table to show how you will record the data * identification of ethical and safety considerations. |

Annotate your deconstruction and design to justify the decisions you have made about such things as the materials you have chosen, the independent and dependent variables, how and why you will control other variables, number of trials, measurements.

Evidence of deconstruction, the method/procedure chosen as most appropriate, and a justification of the plan of action must be a maximum of 4 sides of an A4 page **(minimum font size 10)**.

* Part A and B will be completed individually and will be submitted for assessment on:

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**C Implementing an investigation**

In defined groups, students (in consultation with the teacher) will select one method to implement and to collect data.

Collaborative work.

**D Writing an individual report**

You will use the data collected to write an individual report using the specifications from the subject outline as shown below. This report is based on the investigation that was actually undertaken in Part C.

Maximum 1500 words if written, or a maximum of 9 minutes for an oral presentation, or multimodal equivalent.

Only the following sections of the report are included in the word count:

• introduction

• analysis of results

• evaluation of method/procedure

• conclusion.

The practical report with the deconstruction summary and the method that you designed attached is to be submitted on:

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Specifications of the subject outline highlighted.

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| A practical report must include:   * introduction with relevant physics concepts and either a hypothesis and variables or an investigable question * materials/apparatus * method that outlines the steps taken in Part C * identification and management of safety and/or ethical risks * results, including tables and/or graphs * analysis of results, identifying trends, and linking results to concepts * evaluation of method/procedure and data, and identifying sources of uncertainty * conclusion, with justification. |

Task meets assessment specifications as described in the subject outline:

* a four-page summary of the deconstruction and design is attached to practical investigation report
* individual practical report is based on the method implemented is submitted
* report includes *all* components specified in the subject outline
* at least one practical investigation gives students the opportunity to deconstruct a problem in order to design their own procedure and justify their plan
* at least one practical investigation gives students the opportunity to investigate a question for which the outcome is uncertain
* requirements (including word count) for the report are clearly referred to.

Performance Standards for Stage 2 Physics

| - | Investigation, Analysis and Evaluation | Knowledge and Application |
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| A | Critically deconstructs a problem and designs a logical and coherent physics investigation with detailed justification.  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 effect on data. | Demonstrates deep and broad knowledge and understanding of a range of physics concepts.  Applies physics 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 physics coherently, with highly effective use of appropriate terms, conventions, and representations. |
| B | Logically deconstructs a problem and designs a well-considered and clear physics investigation with reasonable justification.  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 effect on data. | Demonstrates some depth and breadth of knowledge and understanding of a range of physics concepts.  Applies physics 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 physics mostly coherently, with effective use of appropriate terms, conventions, and representations. |
| C | Deconstructs a problem and designs a considered and generally clear physics investigation with some justification.  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 effect on data. | Demonstrates knowledge and understanding of a general range of physics concepts.  Applies physics concepts generally effectively in new or familiar contexts.  Explores and understands aspects of the interaction between science and society.  Communicates knowledge and understanding of physics generally effectively, using some appropriate terms, conventions, and representations. |
| D | Prepares a basic deconstruction of a problem and an outline of a physics 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. | Demonstrates some basic knowledge and partial understanding of physics concepts.  Applies some physics concepts in familiar contexts.  Partially explores and recognises aspects of the interaction between science and society.  Communicates basic physics information, using some appropriate terms, conventions, and/or representations. |
| E | Attempts a simple deconstruction of a problem and a procedure for a physics 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. | Demonstrates limited recognition and awareness of physics concepts.  Attempts to apply physics concepts in familiar contexts.  Attempts to explore and identify an aspect of the interaction between science and society.  Attempts to communicate information about physics. |