**Stage 2 Physics**

Assessment type and task clearly identified.

Assessment Type 1: Investigations Folio

Deconstruct and Design Investigation

Factors Affecting Rotational and Circular Motion in Toys

Context provided for the investigation.

Many children’s toys and activities are based on rotational and circular motion. These include spinning tops, merry-go-rounds, hurdy gurdy, finger spinners, and maypoles.

When making these toys, many factors need to be taken into account such as safety, cost, and the length of time the toy will spin.

In this investigation, you will consider and explore the question “what factors will affect the rotational and circular motion of a spinning toy?”

You will then design and conduct an experiment to determine the effect of *one* factor on the construction of a simple spinning toy.

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

**A Deconstruct the problem**

* Consider the question ‘what factors will affect the rotational and circular motion of a spinning toy?’ Think about what effect they may have on the spinning of the toy.
* Consider how these factors could be tested.
* Make informed decisions about a process that could be used to determine experimentally how one factor might affect the spinning of the toy and how this could be measured. Provide justification for these decisions.
* Think about the risk factors involved in the process.
* Summarise your thinking

Then select *one* factor and develop a method to investigate how *that* factor might influence the construction of a spinning toy.

Specifications of the subject outline highlighted.

**B Designing your own investigation**

Use the guidelines on Page 7 of the subject outline to help you design your practical investigation. Also, keep in mind the requirements of the practical report that are described on page 53 of the subject outline.

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.

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 on Page 53 of the subject outline. This report is based on the investigation that was *actually undertaken* in Part C.

**Maximum 1500 words 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/design summary attached is to be submitted on:

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**Performance Standards**

| - | Investigation, Analysis, and Evaluation | Knowledge and Application |
| --- | --- | --- |
| A | Critically deconstructs a problem and designs a logical, coherent, and detailed physics 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 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.  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.  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. |

Task meets assessment specifications as described in the subject outline:

* individual practical report based on the method implemented is submitted
* 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.

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| **Notes for teachers**  There are many different patterns from which simple spinning toys can be constructed.  Some examples:  https://m.youtube.com/watch?v=K4qGWR\_SBnc.  This one is very simple. Students could vary material used, length of strip, central pointed spindle, add weights etc.  https://m.youtube.com/watch?v=CPV\_5IjFu5o  https://m.youtube.com/watch?v=4qEKxaBC4rA  https://m.youtube.com/watch?v=I140-oHAS2o  https://m.youtube.com/watch?v=Ym5MW3qwbr4  https://m.wikihow.com/Make-a-Spinning-Top  https://babbledabbledo.com/simple-paper-toys-paper-tops/  https://mommypoppins.com/weework-kids-crafts-paper-spinning-top-toy  https://m.youtube.com/watch?v=dRvrm1LQBrw |