**Stage 2 Physics – Assessment Type 1: Investigations Folio**

**Deconstruction and Design Task - Snow Globe**

**Introduction and Purpose of Task:**

Manufacturers believe that one of the important qualities of snow-globes is that the ‘snow’ falls slowly back to the base after it has been shaken up.

Read the information below and consider the problem:

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| “What is the best ‘snow’ to use in a liquid-filled snow-globe?  The purpose of this task is to   * deconstruct the problem by considering some of the issues that need to be addressed * design a detailed method to the test a hypothesis you have constructed based on the problem * justify the decisions made in your design and include a blank data table * complete a practical and collect the data * write a report on the investigation in which you analyse data and evaluate the method used, and make justified conclusions considering the limitations of the experiment. | C:\Users\eyl01\AppData\Local\Microsoft\Windows\Temporary Internet Files\Content.Outlook\ML9VUP9Q\dreamstime_xl_35745652 snowglobe.jpg |
|  | © Libux77 | Dreamstime.com - <a href="<https://www.dreamstime.com/stock-photography-snowglobe-winter-christmas-landscape-image35745652#res13417322>"> |

Part A: Deconstruct the problem. Discuss with your group the factors that the manufacturers would need to take into account when planning what ‘snow’ and liquid to use.

You may wish to consider, for example:

* What factors could affect the time it takes for the ‘snow’ to reach the base?
* Is there a maximum or minimum size that should be used and, if so, why is this important?
* Is any shape acceptable to use as snow?

Summarise your thinking as you consider the problem.

Part B: Design

Individually, further deconstruct the problem by considering how you could test some of these factors in the laboratory, then select one of the factors to test.

Prepare the design for an appropriate investigation and include the following:

* Introduction
* aim and hypothesis
* variables, factors that must be controlled, cannot be controlled
* safety and other risks,
* ethical considerations if applicable
* list of materials
* detailed procedure
* suggest what the results would be if the hypothesis was supported
* any limitations of the experiment or the conclusions that could be drawn, with justification
* a blank data table, prepared to enter the data you plan to record
* references for any research undertaken

Use text boxes to annotate your design to justify your plan of action. For example, explain why you have chosen certain materials, number of samples, measuring techniques, etc.

Evidence of your deconstruction and design should be a maximum of 4 sides of an A4 page. This evidence must be attached to the practical report.

Submit your deconstruction and design for assessment and feedback.

Part C: Conduct an experiment

Collaboratively, you will work in small groups to select one of the methods designed by yourself or a group member and undertake the investigation using. Alternatively, you may use the falling plasticene practical task provided by your teacher.

You will work together safely and collaboratively to collect data.

Part D: Write your report

Individually, you will write a report with the following:

* introduction with relevant physics concepts, and either a hypothesis and variables, or an investigable question
* materials/apparatus
* method/procedure that outlines 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 method/procedure and data, and identifying sources of uncertainty
* conclusion, with justification.

The report should be a maximum of 1500 words if written, or a maximum of 9 minutes for an oral presentation, or the equivalent in multimodal form.

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

* introduction
* analysis of results
* evaluation of method/procedure
* conclusion.

Part B, the deconstruction and design, must be attached to the report of your results.

Additional assessment conditions for this task:

Part A: Supervised small group discussions to begin deconstructing the problem and do some planning during a double lesson. Part B: One week will be provided to complete the individual deconstruction and written design and justification. Internet and other sources of information may be used.

Due Date for design: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Part C: Collaborative completion of the investigation to collect data.

Part D: Individual report (with Part A and B attached) Due Date for Part D: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Assessment Design Criteria

Part A and B:

Investigation, Analysis and Evaluation: IAE1

Part D:

Investigation, Analysis and Evaluation: IAE 2, IAE3, IAE4 Knowledge and Application: KA2, KA4

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| **Note for teachers:** |
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| Teachers may choose to provide students with a method to complete the plasticene investigation (see below) and assess IAE1 using Part E below. |
| In this instance, students would submit a final report based on the method provided by the teacher that includes: |
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| * introduction with relevant physics concepts and either a hypothesis and variables or an investigable question |
| * materials/apparatus |
| * method/procedure that outlines the steps taken |
| * identification and management of safety and/or ethical risks |
| * results |
| * analysis of results, identifying trends, and linking results to concepts |
| * evaluation of procedures and data, and identifying sources of uncertainty |
| * conclusion, with justification. |
| The report should be a maximum of 1500 words, if written, or a maximum of 9 minutes for an oral presentation, or the equivalent in multimodal form.  Only the following sections of the report are included in the word count:  • introduction  • analysis of results  • evaluation of method/procedure  • conclusion.  Evidence of deconstruction (for Part E below) should outline the deconstruction process, the method/procedure chosen as most appropriate, and a justification of the plan of action, to a maximum of 4 sides of an A4 page (minimum font size 10). This evidence must be attached to the practical report. |
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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. |

Task provided by Teacher:

Investigations Folio Task- Part E: Time taken for a shape to fall through a liquid.

**Purpose of the investigation**

To investigate the relationship between the time taken for a plasticine shape to fall through liquid and a property of the shape, such as its area of cross-section, shape or mass.

**Description of assessment**

**Apparatus:** Each group will have access to plasticene, a tall cylinder, water, 3 stopwatches, metre rulers, retort stands, measuring tape, an electronic balance, a knife and a white tile.

**YOUR TASK:**

Design

* In your group, discuss how you could test some of these properties in the laboratory. One double lesson will be available for supervised small group discussion and to do some planning.

Summarise your thinking as you consider the problem.

* *Individually*, select one of the factors to test.
* Prepare the design for an appropriate investigation and include the following:
* Introduction
* aim and hypothesis
* variables, factors that must be controlled, cannot be controlled
* safety and other risks,
* ethical considerations if applicable
* list of materials
* detailed procedure
* suggest what the results would be if the hypothesis was supported
* any limitations of the experiment or the conclusions that could be drawn, with justification
* a blank data table, prepared to enter the data would be recorded
* references for any research undertaken

Use text boxes to annotate your design to justify your plan of action. For example, explain why you have chosen certain materials, number of samples, measuring techniques, etc.

Evidence of your deconstruction and design should be a maximum of 4 sides of an A4 page. This evidence must be attached to the practical report.

Submit your deconstruction and design for assessment with your practical report.

One week will be provided to complete the written design. Internet and other sources of information may be used.

Due Date for deconstruction and design: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_