

2023

Year 11 Integrated Science – Unit 2

Task 8: Newton’s Laws Investigation

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| **Assessment Type:** |  | Name: |  |
| Investigation |  |
| **Duration & Conditions:**  See section notes |  | Teacher: |  |
|  |  |  |  |
| **Assessment weighting:**  12.5% of year mark |  | Date: |  |

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**AIM:** To plan and conduct an investigation that tests / verifies one of Newton’s Laws of Motion

# **ASSESSMENT BREAKDOWN:**

You will have multiple lessons to plan and conduct an experiment. This can be performed in groups or individually. After the experiment, you will have multiple lessons to write a scientific report detailing your findings. This will be completed individually.

# **PART ONE:** Planning

Use your knowledge of motion and the scientific method to design an experiment which investigates **one** of Newton’s Laws of Motion.

You will need to identify the following experiment components:

* Aim
* Hypothesis
* Independent, dependent and controlled variables
* Method

# **PART TWO:** Conducting the experiment

You need to perform your experiment and record any data relevant to the experimental aim.

# **PART THREE:** Scientific report

Your report needs to include the following components:

* *Introduction* – Background information including a clear statement of the law under investigation and a description of how it relates to your experiment. Contains the experiment aim, the variables and hypothesis.
* *Materials* – List and quantity of specific materials used to conduct the experiment
* *Method* – Set of instructional steps that someone else could follow to replicate the experiment
* *Results* – Present all observations and measurements. Use of tables and graphs is required.
* *Discussion* – Discuss your results with reference to your hypothesis and background research. Identify and explain any of the trends your results may (or may not) show. Explain any problems that arose, as well as any potential improvements that could be made.
* *Conclusion* – Use data to justify a statement on whether the experiment achieved the aim and whether the results matched the hypothesis.

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|  | **0 marks** | **1 mark** | **2 marks** | **3 marks** |
| **Introduction**  **(Weighting: 6)** | Incorrect statement of the law | Correctly states the law under investigation | Correctly states the law. Describe the link between the law and the experiment | Correctly states the law. Clearly **explains** link between law and experiment, including **prediction** of behaviour. |
| **Hypothesis**  **(Weighting: 3)** | Hypothesis is inaccurate, missing or does not include required variables. Aim is not valid. | Aim is valid but hypothesis is inaccurate  OR  Hypothesis presents a general outcome but aid is not valid | Formulates a hypothesis that includes dependent and independent variables and  aim is accurate | Formulates a **testable** hypothesis that states the **relationship** between dependent and independent variables. Aim is accurate. |
| **Variables**  **(Weighting: 3)** | Confuses variables | Identifies some variables without detail | Correctly identifies all variables but lacking detail | Correctly identifies variables with specific detail |
| **Method**  **(Weighting: 3)** | Method is incorrect, incomplete or missing | Method is missing steps but generally describes required process | Method is clear and ordered but lacking in detail | Method is clear, ordered and in sufficient detail. Methods allows for appropriate data collection. |
| **Materials**  **(Weighting: 1)** | Not included or incorrect | Materials listed correctly |  |  |
| **Results**  **(Weighting: 6)** | Presents data using basic tables and graphs which are incomplete or contain errors | Presents data using basic tables and graphs | Presents data in a range of forms, including appropriate graphs, tables and charts to show patterns and relationships | **Organises** data logically and presents it in a range of forms, including appropriate graphs and tables to show patterns and relationships |
| **Discussion**  **(Weighting: 6)** | Identifies trends in data incorrectly or overlooks trends | Describes trends in data | Describes and briefly explains trends using relevant scientific concepts | **Analyses** experimental data to describe trends and **explains** these using relevant scientific concepts |
| **Improvements**  **(Weighting: 3)** | Suitable improvements not provided | Describes difficulties  experienced in conducting the investigation and suggests general improvements | Recognises inconsistencies in data and makes general suggestions to improve the design of the investigation | **Explains** any inconsistencies in data and suggests **specific** ways to improve the design of the investigation |
| **Conclusion**  **(Weighting: 3)** | Offers simple conclusions that are not supported by data or are not related to the hypothesis | Draws simple conclusions that may not be linked back to the hypothesis | Uses evidence to make conclusions that relate to the hypothesis | Uses evidence to make and **justify** conclusions that relate to the hypothesis |

**Rubric**