

2022

Year 11 Integrated Science

Unit 2: Physical Science

Task 8: Newton’s Laws Investigation

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| **Assessment Type:** |  | Name: |  |
| Investigation |  |
| **Duration & Conditions:**  Group assessment |  | Teacher: |  |
| 4 lessons |  |  |  |
| **Assessment weighting:**  12.5 % of year mark |  | Date: |  |

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| **Total Mark** |  |

I acknowledge that all the information contained in this task is my own work and not taken from other sources. If other sources have been used, they have been acknowledged in my references.

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(Student Signature)

Please see SEQTA for Teacher feedback and comments

# **ASSESSMENT OVERVIEW**

## **AIM:**

To plan and investigate Newton’s Laws of Motions.

## **PART A:** Research Introduction

After researching each of Newton’s Laws of motion, in your own words, you need to:

* State each of Newton’s Laws in full
* Explain what they mean
* Provide a real-life example
* Explain what valid and reliable results means and require

## **PART B:** Plan Experiment

Working in groups of 3-4 people, use your knowledge of the Scientific method to design an experiment which investigates **ONE** of Newton’s Laws of Motion.

You will need to identify each of the following for your experiment:

* Aim and hypothesis
* Independent, dependent and controlled variables
* Suitable control/experimental group and experimental layout
* Materials (list and quantity of materials/equipment to be used in the experiment) – these need to be **requested at least 1 day BEFORE** the experiment can be conducted
* Method (set of instructional steps that someone else could follow to replicate the experiment, including multiple trials)

## **PART C:** Conduct Experiment

Use the materials and method you developed in part B to conduct your experiment.

When you conduct your experiment, make sure you:

* Follow the method developed in part B, and note any changes made
* Record the results of your experiment using a ruled and accurate table

## **PART D:** Discussion and Conclusion

Once your experiment has been completed, you need to reflect on what resulted.

You need to include:

* Results – including an explanation and a graph of the resulting data
* Discussion – in the hypothesis supported or disproved? What problems were encountered? How could the experiment be improved? What errors were made?
* Conclusion – link the results and findings back to the aim and research conducted. Should be a short statement.

## **PART A:** Research Introduction

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## **PART B:** Plan experiment

**Which of Newton’s Laws are you experimenting?**

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**AIM:** *What is the aim of your experiment?*

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**HYPOTHESIS:** *A positive statement of the possible answer to the problem being investigated.*

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**VARIABLES:**

**Independent Variable:** *What is being changed?*

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**Dependent Variable:** *What is being measured?*

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**Controlled Variables:** *What parts of the experiment are staying the same?*

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**EXPERIMENTAL LAYOUT:**

*How will you control the controlled variables?*

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*How will you ensure that is your experiment is valid and reliable?*

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*How will you set up your experiment?*

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**DRAW A DIAGRAM OF YOUR SET UP:**

**MATERIALS:** *What materials (including quantity) will you need for your experiment?*

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**METHOD:** *Set of instructional steps of how you are going to conduct the experiment.*

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## **PART C:** Conduct Experiment

Complete your investigation using the method you have detailed above.

*Have you made any changes/done anything differently to your original method?*

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**RESULTS:** *Draw your results table below.*

## **PART D:** Discussion and Conclusion

**RESULTS:**

Complete a graph of your results (including title, axis labels with units of measure, even scale and correctly plotted data) using the graph paper provided.

*Explain what your results mean (using your table and graph):*

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**DISCUSSION:**

*Was the hypothesis supported or disproved? How/why?*

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*What problems were encountered and how did you work through them?*

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*What errors were made?*

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*How could the experiment be improved? What would you differently?*

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**CONCLUSION:** *Link back to the aim of your experiment and your research.*

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| --- | --- | --- | --- | --- | --- |
|  | **Criteria** | **0 marks** | **1 mark** | **2 marks** | **3 marks** |
| **Part A** | Newton’s 1st Law | Newton’s First Law is not included | State’s Newton’s Law but does not include accurate description of real-life example. Description of example is missing | State’s Newton’s Law but does not include accurate description of real-life example. | States Newton’s Law accurately in own words. Includes detailed description of a real-life example of the Law. |
| Newton’s 2nd Law | Newton’s Second Law is not included | State’s Newton’s Law but does not include accurate description of real-life example. Description of example is missing | State’s Newton’s Law but does not include accurate description of real-life example. | States Newton’s Law accurately in own words. Includes detailed description of a real-life example of the Law. |
| Newton’s 3rd Law | Newton’s Third Law is not included | State’s Newton’s Law but does not include accurate description of real-life example. Description of example is missing | State’s Newton’s Law but does not include accurate description of real-life example. | States Newton’s Law accurately in own words. Includes detailed description of a real-life example of the Law. |
| **Part B** | Aim and Hypothesis | No aim and/or hypothesis included | Only aim OR hypothesis included, not both | Aim and hypothesis included. Hypothesis is incomplete or not in correct format | Aim and hypotheses included and complete. Hypothesis includes independent and dependent variables. |
| Variables | No variables stated | Variables included, but not correct for experiment | Variables included but incomplete. | Variables included, correct for each section and are detailed |
| Experimental layout | No control group or experimental layout included | Basic explanation of control group and experiment layout included | Detailed explanation of control group and experiment layout included |  |
| Materials | No materials listed | Not all materials listed, not all materials have a quantity | All materials listed with quantities |  |
| Method | No method included | Method is unclear or incomplete | Includes clear and complete method, but is not used for in-class practical | Includes clear and complete method and is used for in-class practical |
| **Part C** | Method | No notes on method conducted | Only parts of the method are used for in-class practical | Notes made of any changes to method during experiment |  |
| Results Table | No results included | Results table included but incomplete | Results table included and completed correctly |  |

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|  | **Criteria** | **0 marks** | **1 mark** | **2 marks** | **3 marks** |
| **Part D** | Results | No graph included and results not discussed | Results are only briefly explained in text. Graph is missing or incomplete. | Results are briefly explained. There is an appropriate graph included to illustrated data collected. | Resulted as explained in text clear and concise language. There is an appropriate graph included to illustrate the data collected. |
| Discussion | Discussion questions not answered | Discussion questions are only answered briefly | Discussion questions are answered but are incomplete or incorrect | Discussion questions are answered in detail. Trends in data are identified and explained |
| Conclusion | No conclusion included | No connection made to the hypothesis or background information | Basic connection made to hypothesis and background information | Detailed connection made to hypothesis and background information |