



ORANGE HIGH SCHOOL

ASSESSMENT TASK NOTIFICATION

Subject	Investigating Science
Year	11 (Preliminary HSC)
Weighting	30%
Teacher	Mrs Boardman
Head Teacher	Mr Shea
Date given	Tuesday the 23 rd of March 2021 – Week 9A Term 1
Date and school week	Wednesday 30th May 2021 - Week 2B Term 2

Assessment Outline

PART 1 – Conducting a scientific investigation to gather data

- To complete this task, you are required to perform a scientific investigation to observe and describe the effect of changing the amount of fertiliser on plant growth. (You will weigh your seeds and weigh the seedlings at the conclusion of the experiment)
- The practical investigation will be performed in class, as a whole group class task. The data gathered will be collated into a collaborative google sheets table that will be accessible through Google Classroom for all students in the class to access.

PART 2 – Formal investigation report

- Students will then be required to analyse and interpret the data collected from the scientific investigation and present it in the format of a formal written scientific report (see provided scaffold). Students will be required to answer a series of questions as part of their analysis (see attached discussion guide sheet).

Non-completion of Task:

If you know you are going to be away on the day that the task is due, you must make alternative arrangements with your classroom teacher. If you are away on the day of the examination, you must catch up with your classroom teacher on the first day you return to make alternate arrangements to catch up on this task.

Failure to follow the above procedures may result in a zero award.

Outcomes Assessed

- INS11 – 1** Develops and evaluates questions and hypotheses for scientific investigation
- INS11 – 2** Designs and evaluates investigations in order to obtain primary and secondary data and information
- INS11 – 3** Conducts investigations to collect valid and reliable primary and secondary data and information
- INS11 – 5** Analyses and evaluates primary and secondary data and information
- INS11 – 8** Identifies that the collection of primary and secondary data initiates scientific investigations
- INS11 – 9** Examines the use of inferences and generalisations in scientific investigations

PRACTICAL FIRST-HAND INVESTIGATION

Weighting: 30%

TOPIC: Cause and Effect - Observing

Due Date: Friday 30th May 2021 - Week 2B Term 2

Task Overview:

This task contains two parts.

PART 1 – Conducting a scientific investigation to gather data

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The practical investigation will be performed in class as a whole group class task. The data gathered will be collated into a collaborative google sheet that will be accessible through Google Classroom for all students in the class to access.

PART 2 – Formal investigation report

Students will then be required to analyse and interpret the data collected from the scientific investigation and present it in the format of a formal written scientific report (see provided scaffold). Students will be required to answer a series of questions as part of their analysis (see attached discussion guide sheet).

Syllabus Outcomes:

INS11 – 1 Develops and evaluates questions and hypotheses for scientific investigation

INS11 – 2 Designs and evaluates investigations in order to obtain primary and secondary data and information

INS11 – 3 Conducts investigations to collect valid and reliable primary and secondary data and information

INS11 – 5 Analyses and evaluates primary and secondary data and information

INS11 – 8 Identifies that the collection of primary and secondary data initiates scientific investigations

INS11 – 9 Examines the use of inferences and generalisations in scientific investigations

Content:

Students:

- Use data gathered to plan a practical investigation to:
 - Pose further questions that will be investigated
 - Discuss the role of variables
 - Determine the independent and dependent variables
 - Formulate a hypothesis that links the independent and dependent variables
 - Describe at least three variables that should be controlled in order to increase the validity of the investigation
- Develop a method to collect primary data for a practical investigation by:
 - Describing how to change the independent variable
 - Determining the characteristics of the measurements that will form the dependent variable
 - Describing how the data will be collected
 - Describing how the controlled variables will be made consistent
 - Describing how risks can be minimised
- Carry out the planned practical investigation, above, to collect primary data
- Apply conventions for collecting and recording observations to qualitatively and quantitatively analyse the primary data, including but not limited to:
 - Tabulation and Graphing
 - Visual and Digital representations

Scientific Report Writing Scaffold:

To write your formal scientific report you must include the following:

Abstract – An abbreviated version of your final report, usually only one paragraph in length. An abstract should have the following five pieces:

- **Introduction.** This is where you describe the purpose of the investigation with reference to background research surrounding the topic being investigated.
- **Problem Statement.** Identify the hypothesis that was investigated.
- **Procedures.** What was your approach for investigating the problem? Don't go into detail about materials unless they were critical to your success. Do describe the most important variables.
- **Results.** What answer did you obtain? Be specific and use numbers to describe your results. Do not use vague terms like "most" or "some."
- **Conclusions.** State what the investigation contributes to the area you worked in. Did you meet your objectives?

Aim – what was the purpose of the investigation?

Literature Review – A literature review is a critical account of what has been published on a topic by accredited researchers. It should provide a clear statement of the topic area (scope), a range of research on the topic, provide an indication of what further research is necessary and identify areas of controversy in the literature. Reviewing the literature requires four stages:

1. Problem formulation - Which topic is being examined and why? What aspects will be included/excluded? Define your scope.
2. Literature search - Identifying relevant research
3. Critical analysis – Criticise the experts; identify conflicting evidence, assumptions, errors and misconceptions
4. Evaluation – which authors are most convincing and provide the most significant scientific contribution? Have I conducted a fair and objective literature review?

Hypothesis - A tentative explanation for an observed phenomenon, expressed as a precise and unambiguous statement that can be supported or refuted by investigation. A hypothesis is based on prior knowledge and clearly identifies how the independent variable will affect the dependent variable.

Equipment list – a detailed list of all equipment used to perform the investigation.

Variables Identified – Correctly identify the variables in the experiment including; independent, dependent and controlled variables. Indicate your control as well (the thing you're comparing to)

Risk Assessment – Students are to conduct a risk assessment of the investigation. At least 3 risks should be included, and three control measures. The risk assessment should be presented as a table. (see below)

Risk:	Control Measure:
Risk 1	
Risk 2	
Risk 3	

Method – As a class we will create a method to conduct the investigation. You must include the method in your report. Your method will need to include any changes that were made to the way the investigation was conducted. It should be in step form, provide clear logical instructions, include how/what equipment is used to collect the data, and include repetition.

Results (table) - first-hand data should be presented in an appropriate table. All tables should be labelled.

Results (graphs) – The following graphs must be included in the scientific report:

- Amount of fertiliser vs height of the plant graph
- Amount of fertiliser vs percentage changes of mass of the plant graph

Make sure that your graphs have appropriate heading, labels on the axis, even scales, and appropriate units. You may draw your graphs using a computer program (excel) or by hand. All graphs should be labelled.

Discussion - This is the section in which you analyse your results. Your discussion should have at least 4 sections.

Section 1: This is the section in which you interpret your results. You should refer directly to the data that was gathered and analyse it using your graph. You should look for trends and discuss why they have occurred. You can link this to your background research to further indicate your understanding of why this trend has occurred.

Section 2: This is the section in which you analyse the accuracy and precision of the data you collected. It is a good idea to give a definition of each term before you start discussing how your investigation performed. You also need to make sure that you provide evidence (specific examples) of how your investigation was/wasn't accurate or precise. You should also include how you could improve the investigation to increase accuracy and precision.

Section 3: This is the section in which you analyse the reliability of the data you collected. It is a good idea to give a definition of the term before you start discussing how your investigation performed. You also need to make sure that you provide evidence (specific examples) of how your investigation was/wasn't reliable. You should also include how you could improve the investigation to increase reliability.

Section 4: This is the section in which you analyse the validity of the data you collected. It is a good idea to give a definition of the term before you start discussing how your investigation performed. You also need to make sure that you provide evidence (specific examples) of how your investigation was/wasn't valid. You should also include how you could improve the investigation to increase validity.

Conclusion – A paragraph summarising the main findings of the investigation. A concluding paragraph should refer to the aim of the investigation and state whether the hypothesis was proven or disproved, and the consequences/implications of this. Your conclusion may identify an area of potential future research based on your investigation. Your conclusion should always be based on evidence and refer directly to evidence from your investigation.

Reference list – This is where you include any references that you used/referred to in your investigation. You should try to use references in your background information section and in your discussion. Please see additional information on how to reference using the APA style.

Appendix/appendices – An appendix is always included in a scientific investigation. An appendix is where you include any calculations (if any) that you made during your investigation, any additional data that you collected, your raw data collected in the investigation (this is where you put your messy table from when you actually conducted the investigation), any additional data manipulation that isn't required in the main results section. You can also include pictures of your investigation set up and overall seed to plant growth.

Bibliography Scaffold:

BOOKS				
Author(s)	Date of publication in brackets	Title of book in italics	Name of publisher	
<u>Example:</u> Keay, J.	(2000).	<i>The Great Arc.</i>	Harper Collins.	
WEBSITES				
Author	Date published if available	Title of Article	Title of website in italics	From URL
	If no date available write (n.d.)			
<u>Example:</u> Landsberger, J.	(n.d.)	Citing Websites.	<i>In Study Guides and Strategies.</i>	http://www.studygs.net/citation.htm .
MAGAZINES				
Author	Date	Title of Article	Name of Magazine	Volume, issue, pages
<u>Example:</u> Tumulty, K	(2006, April).	Should they stay or should they go?	<i>Time</i>	167(15), 3-40.
PERSONAL CONVERSATIONS AND EMAILS				
Person's name	Date	How you know them	Nature of communication	
<u>Example:</u> Mr B. Rock	12/7/16	Geologist and uncle	email	
VIDEOS, DVDS, TV SHOWS ETC				
Producer and writer / director or for youtube the person who uploaded video	Date	Title and type of resource	Country and company producing video / or the URL	
<u>Example:</u> Fothergill, A. (producer), Attenborough, D. (narrator).	(2005)	The Blue Planet – Coral Seas [DVD]	UK, BBC.	

Marking Rubric: Practical first-hand investigation – How does the amount of fertiliser affect plant growth? NAME: _____

Outcomes Assessed:	Developing (D)	Achieving (C)	Thorough (B)	Extensive (A)	Total:
INS11 – 1 Develops and evaluates questions and hypotheses for scientific investigation	<ul style="list-style-type: none"> • Simple aim of investigation included • Hypothesis is unclear <p style="text-align: center;">1 mark</p>	<ul style="list-style-type: none"> • Clear aim of investigation included • Clear hypothesis that reflects the purpose of the investigation <p style="text-align: center;">2 marks</p>	<ul style="list-style-type: none"> • Clear hypothesis that directly links to the aim of the investigation • Hypothesis is reflective of the background information <p style="text-align: center;">3 marks</p>	<ul style="list-style-type: none"> • Clear hypothesis that directly links to the aim of the investigation • Sophisticated hypothesis that is developed from the background information <p style="text-align: center;">4 marks</p>	
INS11 – 2 Designs and evaluates investigations in order to obtain primary and secondary data and information	<ul style="list-style-type: none"> • Identifies variables correctly • Chooses appropriate equipment <p style="text-align: center;">1 mark</p>	<ul style="list-style-type: none"> • Clear risk assessment • Chooses appropriate equipment to complete the practical investigation • Identifies variables correctly, including a number of controlled variables • Method is clear and easy to follow <p style="text-align: center;">2 marks</p>	<ul style="list-style-type: none"> • Clear risk assessment • Chooses appropriate equipment to complete the practical investigation • Identifies variables correctly, including a number of controlled variables • Modifies the method as a result of testing • Method allows for the reliably collection of data <p style="text-align: center;">3 - 4 marks</p>	<ul style="list-style-type: none"> • Clear risk assessment that assesses a range of risks in the investigation • Chooses appropriate equipment to complete the practical investigation • Identifies variables correctly, including a number of controlled variables • Method allows for the reliably collection of data • Evaluates and modifies the method as a result of testing and new evidence <p style="text-align: center;">5 marks</p>	
INS11 – 3 Conducts investigations to collect valid and reliable primary and secondary data and information	<ul style="list-style-type: none"> • List sites or articles used for research • Brief statement of research conducted with some link to the investigation <p style="text-align: center;">1 mark</p>	<ul style="list-style-type: none"> • Summary of each article or source of information with reference to the investigation • 2-3 relevant sources. <p style="text-align: center;">2 marks</p>	<ul style="list-style-type: none"> • Detailed summary of each article or source of information with reference to the investigation • 3 - 4 relevant and reliable sources. <p style="text-align: center;">3 - 4 marks</p>	<ul style="list-style-type: none"> • Detailed and sophisticated summary of each article or source of information with reference to the investigation • 5 or more relevant and reliable sources containing some scientific articles or journals. <p style="text-align: center;">5 marks</p>	
	<ul style="list-style-type: none"> • Requires teacher assistance to conduct the investigation and to select appropriate equipment 	<ul style="list-style-type: none"> • Conducts investigation effectively to collect valid and reliable data • Employs safe work practices and manage risks • Works effectively as a member of team to collect valid and reliable data 	<ul style="list-style-type: none"> • Secondary sources are referenced appropriately • Employs safe work practices and manage risks • Uses appropriate technologies to ensure accuracy • Primary data collection is included in appendix 	<ul style="list-style-type: none"> • Secondary sources are referenced appropriately including in text citations. • Employs safe work practices and manage risks • Uses appropriate technologies to ensure accuracy • Primary data collection is included in 	

Outcomes Assessed:	Developing (D)	Achieving (C)	Thorough (B)	Extensive (A)	Total:
	<p style="text-align: center;">1 mark</p>	<p style="text-align: center;">2 marks</p>	<ul style="list-style-type: none"> • Works effectively as a member of team to collect valid and reliable data <p style="text-align: center;">3 – 4 marks</p>	<p>appendix</p> <ul style="list-style-type: none"> • Works effectively as a member of team to collect valid and reliable data <p style="text-align: center;">5 marks</p>	
INS11 – 5 Analyses and evaluates primary and secondary data and information	<ul style="list-style-type: none"> • Presents data with limited analysis • Data is disorganised and incomplete <p style="text-align: center;">1 – 2 marks</p>	<ul style="list-style-type: none"> • Identifies trends, patterns and relationships in data and information with limited analysis • Identifies errors and limitations in data • Attempts to evaluate the accuracy, reliability and validity of the investigation • Gathered data is presented in appropriate tables and graphs in the results section of the report <p style="text-align: center;">3 – 5 marks</p>	<ul style="list-style-type: none"> • Describes trends, patterns and relationships in data and information • Describes errors and limitations in data • Evaluates the accuracy, reliability and validity of the investigation • Suggests improvements to the investigation • Gathered data is presented clearly in appropriate tables and graphs in the results section of the report <p style="text-align: center;">6 – 8 marks</p>	<ul style="list-style-type: none"> • Explains trends, patterns and relationships in data and information • Assesses errors and limitations in data • Sophisticated and thorough evaluation of the accuracy, reliability and validity of the investigation • Suggests improvements to the investigation • Gathered data is presented clearly in appropriate tables and graphs in the results section of the report <p style="text-align: center;">9 – 10 marks</p>	
	<ul style="list-style-type: none"> • Presents limited information • Shows limited understanding of the scientific method • Shows limited understanding of the scientific concepts <p style="text-align: center;">1 mark</p>	<ul style="list-style-type: none"> • Communicates basic information in the form of a scientific report • Uses some scientific terminology <p style="text-align: center;">2 marks</p>	<ul style="list-style-type: none"> • Presents a well-organized report • Selects and uses suitable forms of digital, visual and written forms of communication • Selects and applies appropriate scientific notations, nomenclature and scientific language to communicate <p style="text-align: center;">3 – 4 marks</p>	<ul style="list-style-type: none"> • Presents a sustained, logical and cohesive report supporting conclusions/ideas with evidence • Selects and uses effective forms of digital, visual and written forms of communication • Selects and applies appropriate scientific notations, nomenclature and scientific language to communicate in a variety of contexts <p style="text-align: center;">5 – 6 marks</p>	

Outcomes Assessed:	Developing (D)	Achieving (C)	Thorough (B)	Extensive (A)	Total:
INS11 – 8 Identifies that the collection of primary and secondary data initiates scientific investigations INS11 – 9 Examines the use of inferences and generalisations in scientific investigations	<ul style="list-style-type: none"> Demonstrates a limited understanding of how the amount of fertiliser affects plant growth and describes how to conduct a valid investigation <p style="text-align: center;">1 mark</p>	<ul style="list-style-type: none"> Describes how the amount of fertiliser affects plant growth and describes how to conduct a valid investigation Applies an understanding of the “scientific method” in relation to plant growth and literature review <p style="text-align: center;">2 marks</p>	<ul style="list-style-type: none"> Describes and explains how the amount of fertiliser affects plant growth and describes how to conduct a valid investigation Applies an understanding of the “scientific method” in relation to plant growth and literature review <p style="text-align: center;">3 - 4 marks</p>	<ul style="list-style-type: none"> Applies an understanding of how the amount of fertiliser affects plant growth and describes how to conduct a valid investigation Analyses the “scientific method” in relation to plant growth and literature review <p style="text-align: center;">5 marks</p>	
	<ul style="list-style-type: none"> Abstract contains a brief summary of 3 of the following: the aim, hypothesis, method used, key results or conclusion <p style="text-align: center;">1 – 2 marks</p>	<ul style="list-style-type: none"> Abstract is a summary of the aim, hypothesis, method used, key results and a conclusion <p style="text-align: center;">3 marks</p>	<ul style="list-style-type: none"> Abstract shows a thorough understanding of the key questions, a summary of the method used, key results (with reference to collected data) and a conclusion <p style="text-align: center;">4 marks</p>	<ul style="list-style-type: none"> Abstract extensively shows an understanding of the key questions, a summary of the method used, key results (with reference to trends observed) and a conclusion <p style="text-align: center;">5 marks</p>	
				Total Marks:	__/45

Teacher Feedback:
