



ORANGE HIGH SCHOOL

ASSESSMENT TASK NOTIFICATION

Subject	Extension Science
Topic	Module 4 Scientific Research Report
Class Teacher	Miss J Huggett
Head Teacher	Miss J Huggett
Year	12
Date Given	Week 2B Term 3
Date Due	Week 4B Term 3 Friday 9AM on Google Classroom or Emailed to Miss Huggett
Weighting	40%

Assessment Outline

Your task is to engage in a Scientific Research Project to explore contemporary issues, problems and potential new discoveries, in depth, while extending your skills and knowledge. The project requires the compilation of a Scientific Research Portfolio that supports and provides a record of the relevant processes used to produce a Scientific Research Report. You are required to:

- create and maintain your research portfolio
- prepare a response to a formulated hypothesis from a scientific research question using a scientific report-style format

(Please see over page for more detail on what is required in your report)

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 teacher beforehand. If you are suddenly away on the day that the task is due, you must contact your teacher or Head Teacher on your return to school. Documentation will be required in both cases.

Plagiarism:

Plagiarism, the using of the work of others without acknowledgement will incur serious penalties and may result in zero award. Any cheating will also incur penalties.

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

The policies and procedures that are outlined on the ROSA booklet will be followed regarding the non-completion of assessment tasks.

Outcomes Assessed

SE-1 refines and applies the Working Scientifically processes in relation to scientific research

SE-2 analyses historic and cultural observations, ethical considerations and philosophical arguments involved in the development of scientific knowledge and scientific methods of inquiry

SE-3 interrogates relevant and valid peer-reviewed scientific research to develop a scientific research question, hypothesis, proposal and plan

SE-4 uses statistical applications, mathematical processes and/or modelling to gather, process, analyse and represent reliable and valid datasets

SE-5 analyses and applies the processes used in reliable and valid scientific research to solve complex scientific problems and inform further research

SE-6 analyses and reports on a contemporary issue or an application of science informed by primary or secondary-sourced data, or both, in relation to relevant publicly available data sets

SE-7 communicates analysis of an argument or conclusion incorporating appropriate scientific language and referencing techniques in a scientific report

Task 3: Scientific Research Report and Portfolio DUE: Term 3 Week 4 2023

Outcomes

Weighting: 40%

You will be assessed on:

Outcomes

- SE-1 refines and applies the Working Scientifically processes in relation to scientific research
- SE-2 analyses historic and cultural observations, ethical considerations and philosophical arguments involved in the development of scientific knowledge and scientific methods of inquiry
- SE-3 interrogates relevant and valid peer-reviewed scientific research to develop a scientific research question, hypothesis, proposal and plan
- SE-4 uses statistical applications, mathematical processes and/or modelling to gather, process, analyse and represent reliable and valid datasets
- SE-5 analyses and applies the processes used in reliable and valid scientific research to solve complex scientific problems and inform further research
- SE-6 analyses and reports on a contemporary issue or an application of science informed by primary or secondary-sourced data, or both, in relation to relevant publicly available data sets
- SE-7 communicates analysis of an argument or conclusion incorporating appropriate scientific language and referencing techniques in a scientific report

Content

Maintaining the Scientific Research Portfolio

Inquiry question: How do scientists journal the scientific process?

Students:

- respond to coursework and inquiry questions in written form
- document and maintain a Scientific Research Portfolio to record the processes involved in the scientific research component of the course in regard to the chosen discipline(s)
- record and log sequential development of the scientific research process
- conduct a review of the literature
- justify the scientific research question
- prepare summaries of secondary-sourced investigations
- analyse and record data

- represent and display data
- apply appropriate referencing protocols throughout the portfolio
- make entries into the portfolio that evidence the development of the scientific research

The Scientific Research Report

Inquiry question: How do scientists present a scientific research report?

Students:

- prepare a response to a formulated hypothesis from a scientific research question using a scientific report-style format, including:
 - title
 - abstract
 - literature review
 - scientific research question
 - hypothesis
 - methodology
 - results
 - discussion
 - conclusion
 - reference list
 - appendices

Task

Your task is to engage in a Scientific Research Project to explore contemporary issues, problems and potential new discoveries, in depth, while extending your skills and knowledge. The project requires the compilation of a Scientific Research Portfolio that supports and provides a record of the relevant processes used to produce a Scientific Research Report. You are required to:

- create and maintain your research portfolio
- prepare a response to a formulated hypothesis from a scientific research question using a scientific report-style format

The following information is taken from the syllabus and should help guide the production of your report.

Students must propose and develop a research question, formulate a hypothesis and develop evidence-based responses in the form of a Scientific Research Report, which is supported by a Scientific Research Portfolio.

The Scientific Research Report is a result of the student's own work and must adhere to the principles and practices of good scholarship, as identified in the HSC: All My Own Work course. While students may collaborate with and draw upon the expertise, knowledge and data held by others in developing their Scientific Research Report and Portfolio, this assistance must be referenced using accepted protocols. All scientific research must be sensitive to community expectations in relation to the question being interrogated. Students must adhere to ethical practices in the collection and analysis of data and the communication of results.

The Scientific Research Report and Portfolio produced in this course may be an extension of, but must not overlap with or significantly duplicate, any depth study attempted in the Year 11 or Year 12 Biology, Chemistry, Earth and Environmental Science, Investigating Science or Physics courses.

The Scientific Research Report

A scientific research report or paper (approximately 2500–3000 words) has a formal structure. Regardless of the scientific discipline the report is prepared in a way that can be clearly interpreted by academics or other scientists. The order in which the sections of a report appear are, however, not necessarily in the order they are written. For example, the abstract appears at the beginning but is written once the scientific research findings have been determined.

The Title

A title is a stand-alone statement that is specific, precise and informative, and provides the aim of the investigation. It is not a restatement of the scientific research question or the hypothesis. The title should appear on the cover page.

The Abstract

The abstract is a one paragraph (approximately 100–200 words) summary of the scientific research investigation. It contains the question, the methods, key results and conclusions. It should be accurate and precise. Referencing is not needed in the abstract.

Literature Review

This section (approximately 750–1000 words) is designed to inform the reader of the relevance of the scientific research and includes background information enabling the reader to understand the key areas involved. It is usual to start the review with a broad scope and become more specific. Sources used are to be current and, where possible, original articles referenced rather than reviews of the articles.

Scientific Research Question

The scientific research question addresses a single independent variable but may be broken down into subparts if multiple aspects are involved and are directly related. The Scientific Research Project should have a single major focus and subsequently only one main scientific research question. The question should be clear, precise and specific; written in scientific language, and be developed from the review of the literature.

Scientific Hypothesis

Once the scientific research question has been chosen, a hypothesis is then formulated. A hypothesis is a statement that relates an independent variable to a dependent variable in a causal relationship that can be tested.

Methodology

The methodology is usually written first and is refined as the scientific research progresses. The methodology should be written in passive voice, simple past tense and contain enough specific and detailed information so that it can be repeated by another scientist to obtain the same results.

Results

The results are based upon the facts. This section describes what was observed, calculated or the trends discovered. It is not an explanation of the results. The order of the results can either follow the order of the methodology or, maybe, in order of most important to least important. Results may include tables, graphs and/or other visual representations to highlight important features. It may be relevant to comment on the degree of uncertainty stated for each set of data collected. All visual displays should be labelled with a number, concise name and a stand-alone description of how the result was obtained. It is useful to integrate visual displays with text so that the reader is guided through the research.

Discussion

The discussion (approximately 700–1200 words) forms the argument and provides an explanation of the phenomenon that was investigated. Other peer-reviewed scientific research should be used and referenced to discuss findings and to form an academic argument. The discussion includes an evaluation of the data-analysis and an explanation of the results, why they occurred, key limitations and further implications with suggestions for future directions of scientific research.

Conclusion

The conclusion (approximately 250–500 words) is a summary of the scientific research findings and is usually one or two paragraphs in length and should not introduce new information.

Reference List

All sources of information and data that are used to inform the scientific research should be cited using an appropriate footnoting and referencing style.

Appendices

Appendices are not essential, but are used to include relevant documents that are either too large or that detract from the flow of the report. They are to be numbered and referred to in the text.

The Scientific Research Portfolio

The Scientific Research Portfolio supports and guides the development of the Scientific Research Report. It provides a record of the processes and documents the information gathered, the analysis of data and the development of the report.

The portfolio is an active, working, purpose-built set of documents that facilitates organisation and ensures that students reflect on their work and maintain information and records of their actions and findings. It is used to evidence students' original work and maintain records of teacher feedback, comments and observations. The portfolio also provides evidence for the acknowledgement of secondary-sourced information used and clarifies the scientific research methodology, leading to a logical evidence-based Scientific Research Report. The portfolio may be maintained in digital format.

The following information is provided to assist students in identifying the key structural elements of the portfolio. Each element may be revisited a number of times and the order of engagement with each element may vary.

Section 1

Planning may include:

- an action plan with milestones and a timeframe for each stage of the Scientific Research Project
- a log of the sequential development of the scientific research process
- summaries and annotated extracts of peer-reviewed scientific research and statements of applicability to the Scientific Research Project
- a developing reference list using correct formatting from the chosen format
- a referenced literature review appropriate to the scientific research question
- a concept map or alternative strategy for generating ideas for the scientific research, including references to literature and justification for their selection
- a refined and justified scientific research question
- a refined and justified scientific hypothesis.

Section 2

Evidence of data collection and analysis may include:

- work samples of various methods for obtaining qualitative and quantitative scientific research including relevant publicly available data sets
- criteria for the choice of a variety of relevant data sets pertaining to the scientific research
- work samples demonstrating skills of recording, processing, organising and storing data
- work samples demonstrating proficiency in gathering small data sets and applying appropriate scientific skills
- manipulation, presentation and analysis of data in a variety of forms.

Section 3

Reflections of the research process may include:

- extracts of students' drafts with reasons for changes and critical questions from peers and/or teachers
- revisions of the scientific research with justifying statements
- examples of final edits, including use of scientific language, plausibility and logical progression of scientific arguments
- suggestions for improvements to the Scientific Research Project, including its methods
- suggestions for future directions to further the scientific research.

Communication and collaboration with scientific researchers, scientists and scientific institutions, both nationally and internationally, can assist students to achieve the outcomes of the course. All assistance and materials gathered, including data, must be appropriately referenced and acknowledged using accepted protocols.

Submission:

- The Scientific Research Report must be submitted digitally via email to jess.huggett@det.nsw.edu.au
- The uploaded Scientific Research Report must be 2500–3000 words. Word limits are indicated for selected components of the Scientific Research Report. The word count is based on all words written, as shown by a computer word count or manual count of each word. In-text referencing or footnotes are NOT included in the word count.
- The uploaded Scientific Research Report must be word-processed, with the body text in 12 point Times New Roman or Arial, with 1.5 line spacing.
- A footer with the student number and page reference should be included.

Marking guidelines

Criteria		D (Basic)			C (Sound)			B (High)			A (Outstanding)			Marks
<i>Planning and Submission</i>	<ul style="list-style-type: none"> submitted a project with limited planning failed to format their scientific report as a scientific paper 	<ul style="list-style-type: none"> completed a scientific investigation with moderate planning produced a research report with a structure loosely resembling a scientific paper 	<ul style="list-style-type: none"> completed a scientific investigation that shows evidence of careful planning produced a research report with a formal structure in the style of a scientific paper 	<ul style="list-style-type: none"> completed a well-planned scientific investigation over a period of time produced a formal scientific research report or paper that comes close to attaining the standards generally required for publication in a scientific journal 	<ul style="list-style-type: none"> completed a valid scientific investigation over a period of time produced a formal and detailed scientific research report or paper that reflects the standards generally required for publication in a scientific journal addressed an issue of social or scientific significance 	(1 marks)	(2 marks)	(3 marks)	(4 marks)	(5 marks)				
<i>Abstract</i>	<ul style="list-style-type: none"> failed to include an abstract, summarising the investigation 	<ul style="list-style-type: none"> included a poorly-structured abstract 	<ul style="list-style-type: none"> included a summary of the investigation in a one paragraph abstract 	<ul style="list-style-type: none"> included a representative summary of the investigation in a one paragraph abstract 	<ul style="list-style-type: none"> included a concise and well-structured one paragraph abstract that is representative of the entire investigation 	(1 marks)	(2 marks)	(3 marks)	(4 marks)	(5 marks)				
<i>Literature Review</i>	<ul style="list-style-type: none"> performed nominal or irrelevant background research 	<ul style="list-style-type: none"> performed limited or general background research 	<ul style="list-style-type: none"> collected background research with some relevance to the subject of investigation no gaps in research identified. 	<ul style="list-style-type: none"> included a clear summary of relevant peer-reviewed information that provides a detailed understanding of the background research and key areas involved. Gaps in current research are identified. 	<ul style="list-style-type: none"> included a concise and comprehensive summary of relevant peer-reviewed research in the field that enables the reader to gain a thorough understanding of the background research and the key areas involved. Clearly establishes the gaps in the research that has led to the development of the research question. 	(1 – 2 marks)	(3– 4 marks)	(5 – 6 marks)	(7 – 8 marks)	(9 – 10 marks)				
<i>Scientific Research Question</i>	<ul style="list-style-type: none"> had no clear aim and the subject of the investigation was vaguely described had an inadequate understanding of the science concepts used in the investigation 	<ul style="list-style-type: none"> launched into the investigation without evidence of questioning and the subject of the investigation was adequately described had minimal understanding of the science concepts used in the investigation 	<ul style="list-style-type: none"> proposed relevant inquiry questions that could be investigated scientifically had measurable aims and the subject of the investigation was clearly described had a good knowledge and understanding of the science concepts used in the investigation 	<ul style="list-style-type: none"> proposed and developed inquiry questions that could be investigated scientifically had realistic aims and well-described the subject of the scientific investigation had a detailed knowledge and understanding of the science concepts used in the investigation 	<ul style="list-style-type: none"> developed, proposed and evaluated inquiry questions to identify an issue or phenomenon that could be investigated scientifically had well-defined aims and clearly expressed the subject of the investigation demonstrated deep knowledge and understanding of related science concepts 	(1 marks)	(2 marks)	(3 marks)	(4 marks)	(5 marks)				

<p>Scientific Hypothesis</p>	<ul style="list-style-type: none"> no hypothesis given 	<ul style="list-style-type: none"> wrote an irrelevant hypothesis 	<ul style="list-style-type: none"> proposed a relevant hypothesis 	<ul style="list-style-type: none"> proposed a null and alternate hypothesis based on prior research or previous observations 	<ul style="list-style-type: none"> formulated a testable null and alternate hypothesis based on prior research and/or previous observations
<p>Methodology – Risk Assessment Experiment Design Accuracy Variables</p>	<ul style="list-style-type: none"> Risk assessment not conducted. selected equipment and technologies that were inaccurate failed to recognise or control variables 	<ul style="list-style-type: none"> considered experimental risks but did not conduct a formal risk assessment lacked innovative or creative ideas used equipment and technologies without considering accuracy controlled some variables 	<ul style="list-style-type: none"> conducted a risk assessment prior to experimentation had some innovative or creative ideas but did not develop them used appropriate equipment and technologies for better accuracy used thorough scientific methodology including the control of variables 	<ul style="list-style-type: none"> conducted a carefully considered risk assessment prior to experimentation had been innovative or creative in content or methodology selected equipment and technologies to improve the accuracy of the collected data identified independent and dependent variables and worked to control them 	<ul style="list-style-type: none"> accurately identified and took steps to minimise potential investigative risks had been innovative or creative in their approach, content, methodology or communication to the audience identified and assessed a range of procedures and provided convincing arguments for the procedure selected justified the selection of equipment and technologies to optimise the accuracy of the collected data identified independent and dependent variables and took deliberate steps to regulate and keep controlled variables constant
<p>Results</p>	<ul style="list-style-type: none"> Inappropriate or incomplete data gathered/used. 	<ul style="list-style-type: none"> gathered some first-hand data without replication 	<ul style="list-style-type: none"> gathered first-hand data with replication 	<ul style="list-style-type: none"> gathered experimental data over a number of trials using appropriate technologies recorded data in a systematic manner using correct units data organised and presented in appropriate tables, graphs and/or visuals. Applies appropriate statistical testing to data 	<ul style="list-style-type: none"> made relevant observations using replicated trials recorded data in an organised, sequential and logical manner using correct units data organised and presented in detailed appropriate tables, graphs and/or visuals. Applies appropriate statistical testing to data
<p>Discussion</p>	<ul style="list-style-type: none"> failed to identify trends, patterns and relationships in the data failed to use any form of statistical analysis 	<ul style="list-style-type: none"> identified limited trends, patterns and relationships in the data used formative statistical tools to measure central tendencies of a data set 	<ul style="list-style-type: none"> analysed and explained trends, patterns and relationships in the data collected used appropriate statistical tests of confidence to data sets synthesised collected data and constructed evidence-based arguments 	<ul style="list-style-type: none"> used analytical tools to evaluate trends, patterns and relationships in collected data used appropriate statistical tests of confidence to data sets and considered the degree of uncertainty for each set of data collected used critical thinking to synthesise information and construct evidence-based arguments 	<ul style="list-style-type: none"> used analytical tools to evaluate trends, patterns and relationships in collected data used appropriate statistical tests of confidence to data sets and considered the degree of uncertainty for each set of data collected used critical thinking to synthesise information and construct evidence-based arguments

<p><i>Conclusion</i></p>	<ul style="list-style-type: none"> ● manufactured conclusions lacking supporting information and scientific accuracy (1 marks) 	<ul style="list-style-type: none"> ● conclusion stated with limited reference to findings from the investigation. (2 marks) 	<ul style="list-style-type: none"> ● Sound conclusion that states the main findings of the investigation. ● Conclusion linked to scientific research question. (3 marks) 	<ul style="list-style-type: none"> ● Clear conclusion that summarises the main findings of the investigation. ● Clearly linked to scientific research questions. ● Conclusions links to hypothesis. ● No new information presented. (4 marks) 	<ul style="list-style-type: none"> ● Clear and concise conclusion that thoroughly summarises the key findings of the investigation ● Conclusion is clearly linked to the scientific research questions. ● Includes a clear statement addressing the hypothesis ● No new information is presented (5 marks)
<p><i>Reference List and Overall Impact</i></p>	<ul style="list-style-type: none"> ● neglected to acknowledge assistance given ● communicated the report with poor expression and inadequate use of visuals (1 marks) 	<ul style="list-style-type: none"> ● received some assistance but did not provide details of the assistance given ● communicated the report with adequate use of language, visuals and sequencing (2 marks) 	<ul style="list-style-type: none"> ● acknowledged any assistance given and referenced any source of information used ● communicated the report with good use of language, visuals and sequencing appropriate to the intended audience (3 marks) 	<ul style="list-style-type: none"> ● acknowledged and provided details of any assistance given and incorporated appropriate referencing techniques when citing sources of information and data ● communicated the report with effective use of language, visuals and sequencing (4 marks) 	<ul style="list-style-type: none"> ● formally acknowledged those who contributed to the project and cited sources of information and data using an appropriate footnoting and referencing style ● used clear, concise and consistent scientific language and terminology that is meaningful for the intended audience or purpose ● selected and used suitable forms of visual, written and/or digital forms of communication (5 marks)
<p><i>Portfolio</i></p>	<ul style="list-style-type: none"> ● neglected to include a log book (1 marks) 	<ul style="list-style-type: none"> ● provided limited or disorganised documentation in the accompanying log book (2 marks) 	<ul style="list-style-type: none"> ● provided supporting documentation in the accompanying log book (3 marks) 	<ul style="list-style-type: none"> ● included a log book detailed the different stages of the investigative process (4 marks) 	<ul style="list-style-type: none"> ● included a comprehensive log book or portfolio, detailing the investigative process, from brainstorming, through data collection and analysis to the final conclusion (5 marks)
<p>TOTAL</p>	<p>174</p>				

Comments