## Stage 2 Scientific Studies: Assessment Type 1: Investigation Folio

**Science Inquiry Skills – Task 2**

**“*Investigating myths surrounding water*”**

The purpose of this task is to research a scientific myth or misunderstanding and use science inquiry skills to challenge its validity.

**Introduction**

Water is an essential part of life and without it, people can die within a few days. Its importance, means that we place a lot of faith in the water we drink. For some, accessing clean water can be an issue. In countries where clean water is readily available, some bottled water brands have taken to making claims about the ‘purity’ or ‘health-promoting properties’ of their water in order to sell their product.

In fact, this is not a new phenomenon. Take for example the ‘Radium Ore Revigator’. Wikipedia.org states:

*“The Radium Ore Revigator was a pseudoscientific medical device consisting of a ceramic water crock lined with radioactive materials. It was patented in 1912 by R. W. Thomas. Thomas was working at the time as a stock salesman in Arizona but, by 1923, had moved to southern California to begin manufacture of his patent. In 1924, following several successful advertisement campaigns that left him unable to keep up with demand, he sold his operation to Dow-Herriman Pump & Machinery Company, selling thousands of the devices in the 1920s and 1930s. The Revigator was intended to be filled with water overnight, which would be irradiated by the uranium and radium in the liner, and then consumed the next day. This was marketed as a healthy practice which could prevent illnesses including arthritis, flatulence, and senility.*

*The Revigator contained carnotite K2(UO2)2(VO4)2·3H2O. Water stored overnight in a vintage Revigator was analyzed by ICP/MS and radiation detectors. Although the water contained higher levels of radon, the health risk from radiation was low. Even so, the water contained detectable levels of arsenic, lead, vanadium, and uranium.”*

*https://en.wikipedia.org/wiki/Radium\_Ore\_Revigator*

In 2006, ratepayers in Toowoomba, Queensland voted against the ‘Water Futures Scheme’; the scheme was designed to recycle water in Toowoomba and return it to the main supply, a concept affectionately called ‘toilet to tap’. Although the water is scientifically proven to be more than safe for human consumption, the ‘yuck’ factor of ‘drinking your wee and poo’ prevented the project from progressing.

Numerous water reclamation systems are in place worldwide which treat water and return it to the potable water supply. The myth that it is contaminated has prevented Toowoomba from a potential supply of potable water that could ease its water supply issues.

**Task**

Your task is to select a water-related myth or misunderstanding from a concept studied during your course.

You should investigate all points of view and present a balanced conclusion confirming them as myths or dispelling them as truthful claims. You will work in small groups of 2 – 3.

Topics worth looking into could include (but are not limited to):

* alkalising water
* chlorinating water
* fluoridation of water
* desalination
* recycling of water
* homeopathy
* drinking water enriched with hydrogen peroxide
* magnetically treating water for agriculture
* the water energy work of Masaru Emoto

You should concentrate on explaining the myths concisely and demonstrate your application of the scientific method in relation to the evidence to draw a logical conclusion. This could include a critique of the procedures published in the research that portrays the myth.

You must also comment on how effectively group members collaborate and the impact this has on the outcome.

**Assessment conditions**

You are to present your report as a multimodal presentation with a maximum of 3 minutes per student.

All oral submissions will be recorded for moderation purposes.

You must submit your multimodal report electronically using the following naming protocol:

*SACE registration number-2STU20-AT1-SIS task 2*

**Assessment Design Criteria**

Your report will be assessed against the following Performance Standards

* Investigation, Analysis, and Evaluation: IAE 4, 5
* Knowledge and Application: KA 1, 2, 4

**Considerations**

* Use the scientific method to investigate the myth or misunderstanding
* Make sure you look at all sides of the argument
* You should remain objective to the possibility of the myth being true should sufficient evidence exist or provide an explanation for the lack of evidence that supports the myth

**Performance Standards for Stage 2 Scientific Studies**

| - | **Investigation, Analysis, and Evaluation** | **Knowledge and Application** |
| --- | --- | --- |
| **A** | **Critically** deconstructs a problem and designs a **logical**, **coherent**, and **detailed** scientific investigation using a scientific method and/or engineering design process.  Obtains, records, and represents data, using **appropriate** procedures, 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.  **Critically** and **perceptively** evaluates the effectiveness of collaboration and its impact on results/outcomes. | Demonstrates **deep and broad** knowledge and understanding of a **range** of science inquiry skills and scientific concepts.  Applies science inquiry skills and scientific 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 science concepts coherently, with **highly effective** use of **appropriate** terms, conventions, and representations. |
| **B** | **Logically** deconstructs a problem and designs a **well**-**considered** and **clear** scientific investigation using a scientific method and/or engineering design process.  Obtains, records, and represents data, using **appropriate** procedures, 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.  **Critically** evaluates the effectiveness of collaboration and its impact on results/outcomes. | Demonstrates **some depth and breadth** of knowledge and understanding of a **range** of science inquiry skills and scientific concepts.  Applies science inquiry skills and scientific 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 science concepts with **mostly coherent and effective** use of appropriate terms, conventions, and representations. |
| **C** | Deconstructs a problem and designs a **considered** and **generally** **clear** scientific investigation using a scientific method and/or engineering design process.  Obtains, records, and represents data, using **generally** **appropriate** procedures, 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.  Evaluates the effectiveness of collaboration and its impact on results/outcomes. | Demonstrates knowledge and understanding of a **general range** of science inquiry skills and scientific concepts.  Applies science inquiry skills and scientific concepts **generally effectively** in new **or** familiar contexts.  Explores and understands **aspects** of the interaction between science and society.  Communicates knowledge and understanding of science concepts with **generally effective** use of appropriate terms, conventions, and representations. |
| **D** | Prepares a **basic** deconstruction of a problem and an **outline** of a scientific investigation using a scientific method and/or engineering design process.  Obtains, records, and represents data, using procedures, 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.  **Attempts** to evaluate the effectiveness of collaboration and its impact on results/outcomes. | Demonstrates **some basic** knowledge and **partial** understanding of science inquiry skills and scientific concepts.  Applies **some** science inquiry skills and scientific concepts in **familiar** contexts.  **Partially** explores and **recognises** aspects of the interaction between science and society.  Communicates basic scientific information, using **some** appropriate terms, conventions, **and/or** representations. |
| **E** | **Attempts** a **simple** deconstruction of a problem and a procedure for a scientific investigation using a scientific method and/or engineering design process.  **Attempts** to use **some** procedures and 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.  **Acknowledges** the effectiveness of collaboration and its impact on results/outcomes. | Demonstrates **limited** recognition and **awareness** of science inquiry skills **and/or** scientific concepts.  **Attempts** to apply science inquiry skills **and/or** scientific concepts in **familiar** contexts.  **Attempts** to explore and identify **an aspect** of the interaction between science and society.  **Attempts** to communicate **information** about science. |