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

**Individual Inquiry Design Proposal**

**“*Water for the People*”**

The purpose of this task is to prepare a proposal for the externally assessed Individual Inquiry that you will complete for Assessment Type 3.

**Introduction**

Access to clean drinking water is a real issue for many people around the world. During the ‘Make it clear: flocculation and filtration’ folio task, you investigated how dirt and silt could be removed from a sample of water – but clear water can still contain a myriad of contaminants. These invisible enemies, undetectable to the human eye, can include viruses, bacteria other chemical impurities such as heavy metals or PFAS. Of course, it is not just human and industrial sources that pollute water – the oceans are the biggest source of water, yet are undrinkable.

**Task**

You are required to prepare a proposal for your investigation for which the outcome is uncertain. You need to highlight and address a problem for which you can ‘engineer a solution’ and test whether your solution was effective.

Your problem should relate to the purification of water containing biological contaminants, chemical contaminants or both. Focus examples include (but are not limited to) treatment of hard water; treatment of water in third world countries; sewerage treatment; desalination processes; treatment of chemical or industrial wastewater; and recycling water for reuse (either in cities or even on the International Space Station).

The design proposal is to include:

1. a question, hypothesis, problem, need or opportunity
2. a deconstruction of the problem that identifies and discusses all variables
3. an outline plan of the proposed approach, method or engineering design process that includes reasons for the chosen approach.
4. a justification of the plan of action e.g. why you are using a particular method or design, apparatus or equipment etc.

**Assessment conditions**

The design proposal should be a maximum of 4 sides of an A4 page if written or diagrammatic, or the equivalent in multimodal form. **Note – this task will be assessed by your teacher and NOT as an external submission.**

The proposal can take the form of:

1. a concept or mind map
2. flow charts
3. an oral or multimodal presentation
4. a science research poster
5. a science grant application

This list is not exhaustive. If you wish to present your ideas differently, you should discuss these with your teacher first.

You must submit your proposal electronically using the following naming protocol:

*SACE registration number-2STU20-AT1-design proposal*

**Assessment Design Criteria**

Your proposal will be assessed against the following Performance Standards

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

**Considerations**

* You are encouraged to focus on a problem that you feel is a relevant real-world water treatment issue, where your engineered solution can lead to an improvement in the lives of others.
* The overall grade for your Individual Inquiry (proposal and investigation combined) is dependent on your ability to apply the scientific method and engineering design process, not necessarily on the technical success of your engineered solution.
* Your teacher will review your design proposal and provide detailed feedback to ensure you are ‘set on the right path’ before you commit to your individual project.
* **You should not proceed with the individual inquiry until you receive feedback from your teacher as this might harm your overall top grade for the** **Individual Inquiry External Assessment.**

**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. |