

2023

Year 11 Integrated Science – Unit 1 Biological & Earth Systems

Task 3: Bacteria Investigation

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| **Assessment Type:** |  | Name: |  |
| Investigation |  |
| **Duration & Conditions:**  See section notes |  | Teacher: |  |
|  |  |  |  |
| **Assessment weighting:**  12.5% of year mark |  | Date: |  |

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| --- | --- |
| **Section** | Marks |
| **Part One: Research** |  |
| **Part Three: Conduct Experiment & Scientific Report** |  |
| **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

**AIM:** To plan and conduct an investigation into the effect of an environmental variable (pH) on bacteria growth.

# **ASSESSMENT BREAKDOWN:**

You will have multiple lessons over three weeks to complete this assessment. The assessment involves planning an experiment, conducting the experiment, analysing the results and writing a scientific report.

# **PART ONE:** Planning

Use your knowledge of scientific method to design an experiment which investigates the impact of pH on bacteria.

You will need to identify the following experiment components:

* Aim
* Hypothesis
* Independent, dependent and controlled variables
* Method

# **PART TWO:** Conducting the experiment

You need to perform your experiment and record any data relevant to the experimental aim.

# **PART THREE:** Scientific report

Your report needs to include the following components:

* *Introduction* – Background information which outlines any relevant background information about the experiment. Contains the experiment aim and hypothesis.
* *Materials* – List and quantity of specific materials used to conduct experiment
* *Method* – Set of instructional steps that someone else could follow to replicate the experiment
* *Results* – Present all observations and measurements as well as tables and graphs where appropriate.
* *Discussion* – Discuss your results with reference to your hypothesis and background research. Attempt to identify and explain any of the trends your results may (or may not) show. Explain any problems that arose, as well as any potential improvements that could be made.
* *References* – Reference list of researched sources to be included, using APA referencing style.

# **TO BE SUBMITTED:**

* Part 3 Scientific Report.

# **PART ONE:** Planning

1. **Aim**: What is the aim of the experiment?
2. Based on your knowledge of bacteria, what do you think that impact of pH on bacteria will be?
3. **Independent variable**: Identify the independent variable in your experiment (the factor you will manipulate).
4. **Dependent variable**: Identify the dependent variable in your experiment (the factor you will measure or observe).
5. **Control variables**: List the variables that you need to keep constant to ensure a fair test. These are variables that could answer impact bacteria growth and need to stay the same for all trials.
6. **Hypothesis**: Based on your answers to Q2 to 5, formulate a hypothesis that predicts the relationship between pH and bacterial growth.
7. **Materials**:List all the materials and equipment you need to conduct the experiment.
8. **Replication:** Experiments, especially in biology, are often repeated to ensure reliable and consistent results. Describe how you will repeat the experiment and for how many times.
9. **Method**: Write a step-by-step procedure for your experiment, including how you will change the independent variable, measure the dependent variable, and control other variables.
10. **Safety**: Identify any potential hazards or risks associated with the experiment and list the safety measures you will take to minimize them.
11. **Data Analysis**: Explain how you will collect and analyse data from your experiment.

# **PART THREE:** Scientific Report

**INTRODUCTION:**

Aim:

Variables:

Independent variable:

Dependent variable:

Controlled variables:

Hypothesis:

**EXPERIMENT:**

Materials:

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**METHOD:**

**DISCUSSION:** No results were collected for this practical.

If results had been collected from this experiment, what influence could the competition of space have on the growth of the seedlings?

What problems did you experience in this experiment?

What improvements/changes could be made if you did the experiment again?

**REFERENCES:**

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| **Criteria** | | **0 marks** | **1 mark** | **2 marks** | **3 marks** | **4 marks** |
| **Part One: Research** | **Competition** | No information provided about competition. | Competition is described briefly. No example included | Competition is described briefly. An example is included, but without a clear description | Competition is described in detail. An appropriate example is included with an explanation. | Competition is described in detail and compared to other symbiotic relationships. An appropriate example is included with an explanation. |
| **Mutualism** | No information provided about mutualism. | Mutualism is described briefly. No example included | Mutualism is described briefly. An example is included, but without a clear description | Mutualism is described in detail. An appropriate example is included with an explanation. | Mutualism is described in detail and compared to other symbiotic relationships. An appropriate example is included with an explanation. |
| **Commensalism** | No information provided about commensalism. | Commensalism is described briefly. No example included | Commensalism is described briefly. An example is included, but without a clear description | Commensalism is described in detail. An appropriate example is included with an explanation. | Commensalism is described in detail and compared to other symbiotic relationships. An appropriate example is included with an explanation. |
| **Parasitism** | No information provided about parasitism. | Parasitism is described briefly. No example included | Parasitism is described briefly. An example is included, but without a clear description | Parasitism is described in detail. An appropriate example is included with an explanation. | Parasitism is described in detail and compared to other symbiotic relationships. An appropriate example is included with an explanation. |
| **Referencing** | No bibliography or references included. | Basic bibliography included. | Reference list included, using correct referencing styles and formatting. |  |  |

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| **Criteria** | | **0 marks** | **1 mark** | **2 marks** | **3 marks** | **4 marks** |
| **Part Two: Planning** | **Aim & Hypothesis** | No aim or hypothesis included | With guidance, constructs a hypothesis, within a context that has been provided. | With guidance, constructs an aim and hypothesis that includes dependent and independent variables, within a context that has been provided. | Constructs an aim and testable hypothesis that includes dependent and independent variables. | Constructs aim and testable hypothesis that states the relationships between the dependent and interdependent variables. |
| **Variables** | No variables included | With prompting, identifies possible variables for experiment | Identifies possible variables for experiment. | Identifies independent, dependent and controlled variables for experiment. | Identifies and details independent, dependent and controlled variables of experiment. |
| **Experimental layout & control / experimental groups** | No experimental design or control groups created. In-class practical not completed. | Experimental design is not used during in-class practical. | Experimental design and control groups not logically organised but used during in-class practical. | Experimental design and control groups logically organised and used during in-class practical. | Experimental design and control groups are thoughtfully and logically organised and used during in-class practical. |
| **Experiment conducted** | Experiment not conducted | Experiment not conducted efficiently. | Experiment conducted. | Experiment conducted effectively and efficiently. |  |

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| **Criteria** | | **0 marks** | **1 mark** | **2 marks** | **3 marks** |
| **Part Three: Conduct Experiment & Scientific Report** | **Method** | Method is incomplete or not included. | Method is unclear and/or incomplete and not used for in-class practical. | Method is unclear but complete and is used for in-class practical. | Method is clear and complete and is used for in-class practical. |
| **Experimental diagrams** | No experimental diagram included. | Diagram is included but unclear or unlabelled. | Includes clear, correctly labelled diagram of equipment. |  |
| **Results** | No results included | Results table completed. Results are not explained in text, graph is missing or incomplete. | Results table completed. Results are briefly explained in text. Graph included but incomplete. | Results table completed. Results are explained in text using clear and concise language. Appropriate and completed graph included. |
| **Discussion** | No discussion included | Trends in data are briefly explained. No connection made to hypothesis or background information. | Trends in the data are identified and explained with references to hypothesis and background research. |  |
| **Referencing** | No bibliography or references included. | Basic bibliography included. | Reference list included, using correct referencing styles and formatting. |  |
| **Sequencing & Formatting** | Report is not typed or in a sequential order or formatted. | Report is typed and in sequential order but has not been formatted appropriately. | Report has been typed and is in sequential order. It has also been formatted correctly. |  |