

Task Number	2	Task Name	Modelling Osmosis
Course	Year 11 Biology	Faculty	Science
Teachers	Mr S. Allen	Head Teacher	Mr Yates
Issue date	27 th May, 2025	Due date	Monday 30 th June, 2025
Focus (Topic)	Module 1: Cells as a Basis of Life	Task Weighting	30%

Outcomes

- designs and evaluates investigations in order to obtain primary and secondary data and information BIO11/12-2
- conducts investigations to collect valid and reliable primary and secondary data and information BIO11/12-3
- analyses and evaluates primary and secondary data and information BIO11/12-5
- communicates scientific understanding using suitable language and terminology for a specific audience or purpose BIO11/12-7
- describes single cells as the basis for all life by analysing and explaining cells' ultrastructure and biochemical processes BIO11-8
- explains the structure and function of multicellular organisms and describes how the coordinated activities of cells, tissues and organs contribute to macroscopic processes in organisms BIO11-9

Task description

Your task will be to **research, plan an investigation, and report on Modelling the process of osmosis.**

The task needs to be presented in a Scientific Report style format, i.e.; Abstract, Introduction, Aim, Hypothesis, Risks, Equipment, Variables, * Method, *Results, Discussion, Conclusion and References.

**You will be provided with a table of results and a method. You will need to graph and analyse these results.*

A scaffold is provided, outlining the content that should be included in each section of the report. The report is **due by 9.30am on Monday 30th June (week 10)**, and should be submitted through the assignment post on Google Classroom.

Marking Guidelines : Students will be assessed on their ability to;

- Plan an investigation effectively, including choosing equipment, assessing risk, identifying variables, designing a reliable and valid method, analysing results and drawing conclusions
- Conduct background research
- Communicate effectively in a scientific format

Failure to submit on the due date, by the due time, will receive a zero mark and an "N Award" warning.

METHOD

Equipment:

- 9 x cylindrical potato pieces 2cm in length
- 9 x 250mL beaker
- Distilled water
- Salt solution (1%)
- Salt solution (3%)
- Electronic scale (to 2 decimal places)
- 50mL measuring cylinder

Steps:

1. Prepare potato pieces using a potato corer, ruler and scalpel.
2. Weigh the 9 potato pieces and record initial weights as Day 0/
3. Pour 50mL distilled water into 3 beakers
4. Pour 50mL of 1% salt solution into 3 beakers.
5. Pour 50mL of 3% salt solution into 3 beakers
6. Label beakers appropriately
7. Place potato pieces into all 9 beakers
8. Store beakers for 7 days in cool, dark environment.
9. Measure the mass of each potato piece each morning using an electronic balance.
10. Record results in table

RESULTS TABLE

Day/time	Mass of potato peice(g)											
	Distilled water				1% salt solution				3% salt solution			
	Trial 1	Trial 2	Trial 3	Ave	Trial 1	Trial 2	Trial 3	Ave	Trial 1	Trial 2	Trial 3	Ave
Day 0 Mon/8:48am	1.66	1.67	1.72	1.68	1.72	1.71	1.66	1.7	1.64	1.76	1.71	1.7
Day 1 Tues/9.30am	2.22	2.09	2.12	2.14	1.65	1.77	1.59	1.67	1.18	1.31	1.31	1.27
Day 2 Wed/9.05am	2.16	2.16	2.1	2.14	1.68	1.74	1.65	1.69	1.33	1.5	1.46	1.43
Day 3 Thurs/8.23am	2.21	NA	NA	2.21	1.72	1.73	1.69	1.71	1.43	1.58	1.52	1.51
Day 4 Fri/ 8.50am	2.25	NA	NA	2.25	1.71	1.72	1.7	1.71	1.43	1.57	1.58	1.53
Day 7 Mon/8.43am	NA	NA	NA	NA	1.77	1.69	1.69	1.72	1.43	1.53	1.53	1.5

Day	Observations/Other
Day 0 Mon	all potato pieces hard and uniform in shape and colour
Day 1 Tues	Trials in 3% solution potato smaller in size, Trials in distilled water potato very hard and enlarged
Day 2 Wed	all potato in 3% solution, very soft and shrunken in size, trials in distilled water potato still hard
Day 3 Thurs	strong odour from all beakers,
	bubbling from Trial 2 Distilled & red colour, very soft and starting to break apart
	Trial 3 Distilled very soft on outside but holding shape
	all 3% solutions cloudy
	Trial 3 3% solution browning on top and bottom edges.
Day 4 Fri	Trial 2 and Trial 3 in distilled water both completely broken apart/dissolved --> unable to weigh
Day 7 Mon	All distilled water trials have been dissolved completely and were unable to weigh.

Marking Criteria

Criteria	Mark
Title Appropriate to the content	0 – 1
Abstract A brief summary outlining the purpose of the report, method followed, key results and conclusion.	0 – 1 – 2 – 3 – 4
Introduction Introduces the topic of the investigation Outlines relevance of the topic to a Biological context Provides background information on osmosis and diffusion	0 – 1 0 – 1 – 2 0 – 1 – 2
Investigation Aim describes purpose of investigation, is one sentence Hypothesis makes a valid prediction, does not use 'I' 2 risks and appropriate minimisation strategies Complete equipment list, method and results in report Correctly identifies independent, dependent and 3 controlled variables Results correctly graphed, averages plotted, axes labelled	0 – 1 – 2 0 – 1 – 2 0 – 1 – 2 – 3 – 4 0 – 1 – 2 – 3 0 – 1 – 2 – 3 – 4 – 5 0 – 1 – 2 – 3
Discussion Includes effective analysis of the results Evaluates validity of experimental design Evaluates reliability of design and results Identifies error(s) and area(s) of improvement Evaluates the success of the experiment as a model for osmosis	0 – 1 – 2 – 3 0 – 1 – 2 0 – 1 – 2 0 – 1 – 2 0 – 1 – 2 – 3
Conclusion Brief summary of report, tied to hypothesis, no new information presented	0 – 1 – 2 – 3
Scientific Report Report written as a Scientific report	0 – 1 – 2 – 3
References At least 3 references, appropriate format used	0 – 1 – 2 – 3
TOTAL	/50

O	H	S	B	L
41 - 46	34 - 40	23 - 33	12 - 22	0 - 11

Feedback:

SCAFFOLD FOR SCIENTIFIC REPORT

A scientific report or paper 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.

A scientific report is always written in third person, That means, do not use; “I”, “we” or “you”.

The title

A title is a stand-alone statement that is specific, precise and informative, and relevant to the research being conducted.

The abstract

The abstract (approximately 150-250 words) is a one paragraph summary of the scientific investigation. It contains the question, the methods, key results and conclusions. It should be accurate and precise. Referencing is not needed in the abstract.

The introduction

This section (approximately 250-400 words) is designed to inform the reader of the relevance of the scientific investigation, 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.

The investigation – containing relevant subheadings

This section should be broken into the relevant sub headings for a scientific investigation. Your **aim** should briefly outline the purpose of the investigation, your **hypothesis** should predict the outcome, your **risk assessment** should identify potential risks and minimisation strategies to avoid those risks. You need to include a complete and accurate list of the necessary **equipment** required to conduct the investigation, and identify the independent, dependent and controlled **variables**. Your **method** should be written as a paragraph, in past tense, and in an impersonal voice.

Results will be provided to you and you must then graph them, and analyse them in a written discussion. Your **discussion** should also evaluate the experimental design for its validity and reliability, identify any errors and suggest possible improvements.

The conclusion

The conclusion (approximately 200-300 words) is a summary of the scientific findings that addresses the hypothesis. It 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 referencing style.

Marking Guidelines

CRITERIA	Grade
Outstanding- Students can: <ul style="list-style-type: none"> effectively use scientific equipment accurately and responsibly to collect all first-hand data record detailed, neat and accurate first-hand data in appropriate forms display evidence of effective research that is accurate, well referenced and extensive in nature. clearly define their chosen environmental impact using technical language and diagrams where appropriate. explains in detail how environmental impacts occur and from where. propose a well-planned, thoroughly researched and justified future management decision that clearly links improved environmental outcomes with proposed actions. use technical language regularly and appropriately as well as following all conventions for the recommendation report. 	O
High- Students can: <ul style="list-style-type: none"> use scientific equipment accurately and responsibly to collect most first-hand data record neat and accurate first-hand data in appropriate forms display evidence of research that is somewhat accurate, referenced and general in nature. define their chosen environmental impact using some technical language and some diagrams. explain how environmental impacts occur and from where. propose a researched and somewhat justified future management decision that links some improved environmental outcomes with proposed actions use technical language regularly as well as following most conventions for the recommendation report. 	H
Sound- Students can: <ul style="list-style-type: none"> use scientific equipment responsibly to collect most first-hand data record first-hand data in appropriate forms display evidence of research that is somewhat referenced and general in nature. define their chosen environmental impact using informal language and some diagrams. analyse some management decisions including a description of the decision or some points for and against the decision or an explanation of the outcome. describe how environmental impacts occur and from where. attempts to propose a recommendation for future management of the area. use some technical language and attempts to follow conventions for the recommendation report. 	S
Basic- Students can: <ul style="list-style-type: none"> use scientific equipment to collect some first-hand data and records some of this first hand data. display some evidence of research undertaken attempt to define their chosen environmental impact using informal language or some diagrams. attempt to describe how environmental impacts occur and from where. attempt to propose a recommendation for future management of the area or reproduces an already existent course of actions. follow some conventions for the recommendation report 	B
Limited- Students can: <ul style="list-style-type: none"> attempt to use scientific equipment and records some first-hand data. display some evidence of research undertaken attempt to describe something relevant to an environmental impact. attempt to describe how environmental impacts occur and from where. attempt to recommend a course of action for the future. 	L
Late submission with no misadventure - Parental notification	0

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| <ul style="list-style-type: none">• Assessment not submitted | |
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