

Notice of Assessment Task Year 11 Biology Scientific Investigation

Date of initial notification:	Date of submission of task:
Tuesday, 11 March 2025	Thursday, 27 March 2025
Week 7, Term 1	Week 9, Term 1
Teacher:	Task Number:
Miss R Nunes	1
Time Allowed:	Weighting of task:
2 Weeks	30%

Course Component/Focus area/topic/module:

Module 1 – Cells as the Basis of Life

Task Description

The Effects of Environmental Factors on Enzyme Activity

Enzymes are essential proteins that catalyse biochemical reactions in cells, ensuring the efficient functioning of metabolic processes. Understanding the impact of environmental factors on enzyme activity is crucial for exploring cellular processes and the conditions that affect life.

You are to **conduct a practical investigation** and **write a scientific report** to examine the effects of environmental factors (e.g., temperature, pH, substrate concentration) on enzyme activity. This investigation involves designing and performing an experiment using a model enzyme (e.g., catalase or amylase) and collecting both qualitative and quantitative data to draw conclusions about enzyme functionality.

When completing the investigation and writing the scientific report, you are to ensure you consider the following elements:

- 1. **Plan and Design** Develop a hypothesis that predicts the effect of a specific environmental factor on enzyme activity. Design an experiment to test your hypothesis, identifying the independent, dependent, and controlled variables. Ensure your method is clear and detailed enough to be replicated.
- 2. **Conduct the Investigation** Carry out the investigation using the provided materials, collecting data systematically. Record qualitative observations (e.g., visual changes) and quantitative data (e.g., time for reaction completion or amount of product formed). Organise your data into tables and graphs to identify trends.
- 3. Analyse and Evaluate Data Analyse your results by comparing them to scientific expectations, discussing reliability and validity, and evaluating your experimental design. Evaluate on how this investigation has enhanced your understanding of enzyme activity.
- 4. **Report Writing** Present your findings in a scientific report, including a title, introduction, hypothesis, materials and methods, results, analysis and discussion, conclusion, and evaluation. Attach raw data and photos of your setup as appendices.

Instructions

- Ensure your name, class, and teacher is clearly labelled.
- All work submitted must be original and completed individually. (NOTE: Any work deemed to be plagiarised will be treated as a non-serious attempt and dealt an appropriate consequence in accordance with the school and faculty policy)

Outcomes/Competencies to be assessed in this task:

BIO11-2 – designs and evaluates investigations in order to obtain primary and secondary data and information **BIO11-4** – selects and processes appropriate qualitative and quantitative data and information using a range of appropriate media

BIO11-5 – analyses and evaluates primary and secondary data and information

BIO11-8 – describes single cells as the basis for all life by analysing and explaining cells' ultrastructure and biochemical processes

Feedback: How will I receive feedback on this task?

MARKING CRITERIA

Preliminary Biology Secondary Source Investigation – Cells as the Basis of Life

Outcomes	Elementary	Basic	Sound	Thorough	Exten	sive	MARKS
BIO11-2 Planning investigations designs and evaluates investigations in order to obtain primary and secondary data and	 Hypothesis is unclear or absent. Experimental design is incomplete or lacks logical structure. Minimal attempt to control variables. 	 Basic hypothesis provided. Experimental design includes independent and dependent variables but lacks detail. Some attempt to control variables. 	 Clear hypothesis linked to the research question. Experimental design includes most variables and allows for valid testing. Adequate control of variables. 	 Logical and testable hypothesis. Well-detailed experimental design with all variables clearly identified and controlled. 	- Soph testak - Com innov exper that e reliab - All v effect	nisticated, ble hypothesis. prehensive and ative imental design insures accuracy, ility, and validity. ariables are ively controlled.	
information	1 mark	2 marks	3 marks	4 marks		5 marks	
BIO11-4 Processing data and information selects and processes appropriate qualitative and quantitative data and information using a range of	 Minimal data collected or data is incomplete. Data is poorly organised or presented. 	 Some data collected with limited organisation (e.g., incomplete tables or graphs). Basic attempt to identify trends. 	 Relevant data collected and organised into tables/graphs. Patterns and trends identified with some analysis. 	 Comprehensive data collection with detailed and accurate tables/graphs. Trends and patterns identified and linked to scientific concepts. 	- Exte collec with c precis - Tren thoro demo under invest	nsive data tion presented clarity and tion. ds and patterns ughly analysed, nstrating deep rstanding of the cigation.	
appropriate media	1 – 2 marks	3 – 4 marks	5 – 6 marks	7 – 8 marks	9	– 10 marks	
BIO11-5 Analysing data and investigations analyses and evaluates primary and secondary data and information	- Limited or superficial evaluation of data. - Minimal discussion of trends or patterns.	 Basic evaluation of data with reference to some trends. Limited discussion of reliability and validity. 	- Clear evaluation of data, identifying trends and addressing reliability/validity.	 Detailed evaluation of data with insightful discussion on trends, reliability, and validity. Some comparison with scientific expectations. 	- Thor with c trend: validit - Com scient and so source	rough evaluation critical analysis of s, reliability, and ty. parison with cific expectations econdary es.	
	1 – 2 marks	3 – 4 marks	5 – 6 marks	7 – 8 marks	9	– 10 marks	
BIO11-8 describes single cells as the basis for all life by analysing and explaining cells' ultrastructure and biochemical	- Limited understanding of enzyme activity or cellular processes. - Minimal links to the investigation.	 Basic understanding of enzyme activity with simple explanations. Links to the investigation are vague. 	 Clear understanding of enzyme activity with explanations linked to experimental results. Some broader scientific links. 	 Comprehensive understanding of enzyme activity and cellular processes. Experimental results are clearly linked to broader scientific concepts. 	 Sophisticated understanding of enzyme activity and biochemical processes. Results are deeply analyzed in the context of broader biological principles. 		
processes	1 mark	2 marks	3 marks	4 marks		5 marks	
TOTAL	/30 GR	RADE	PERCEN	TAGE	%	RANK	/16

COMMENT:

Student Name:

The Effects of Environmental Factors on Enzyme Activity

Introduction

Background Information: Briefly explain what enzymes are and their role in cells. **Aim:** State the purpose of your investigation. **Hypothesis:** Write a testable hypothesis.

• If you are absent on the day that the task is due, you MUST see your teacher the next day (not your next lesson) that you are present at school to show your medical certificate or produce a misadventure form (refer to your Assessment Booklet for a copy of the form).

• Exemptions and extensions for any other reason will only be determined at the discretion of the Head Teacher, and only in extenuating circumstances. You must advise the Head Teacher as soon as possible if you know you are unable to submit the task on the due date.

• All appeals must be lodged within 48hrs of receipt of the task. Students who may consider an appeal are not permitted to take their task home. The original task cannot be altered in any way prior to the appeal process. See Assessment booklet for details.

• Materials: List all equipment and substances used in the experiment.

Risk Assessment

• Hazard Identification: List potential hazards involved in the experiment

- Safety Measures: Describe steps to minimize risks
- Emergency Procedures: Outline actions to take in case of an emergency

Method

• Method: Write a step-by-step description of your procedure. Ensure:

- The independent, dependent, and controlled variables are clearly identified.
- \circ $\;$ The procedure is detailed enough for replication.

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Results

- Data Table: Create a table to record your quantitative data
- **Observations:** Note any qualitative data (e.g., changes in color, bubbling).
- **Graphs:** Construct appropriate graphs to visualize your data (e.g., line graph or bar graph).

Analysis and Discussion

- Trend Analysis: Describe any patterns or trends in your data.
- Link to Scientific Concepts: Explain how your results relate to enzyme activity and biochemical processes.
- Evaluation:
 - Discuss the reliability and validity of your results.
 - o Identify potential sources of error and suggest improvements to your method.
 - Compare your findings with scientific expectations or secondary sources.

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Conclusion

- Summarize your findings.
- State whether your hypothesis was supported or not.

• Reflect on the significance of your results.

Additional Writing Space:

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