



Notice of Assessment Task

Year 11 Biology

Scientific Investigation

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

Written

MARKING CRITERIA

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

Outcomes	Elementary	Basic	Sound	Thorough	Extensive	MARKS
BIO11-2 Planning investigations designs and evaluates investigations in order to obtain primary and secondary data and information	- 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.	- Sophisticated, testable hypothesis. - Comprehensive and innovative experimental design that ensures accuracy, reliability, and validity. - All variables are effectively controlled.	
	<i>1 mark</i>	<i>2 marks</i>	<i>3 marks</i>	<i>4 marks</i>	<i>5 marks</i>	
BIO11-4 Processing data and information selects and processes appropriate qualitative and quantitative data and information using a range of appropriate media	- 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.	- Extensive data collection presented with clarity and precision. - Trends and patterns thoroughly analysed, demonstrating deep understanding of the investigation.	
	<i>1 – 2 marks</i>	<i>3 – 4 marks</i>	<i>5 – 6 marks</i>	<i>7 – 8 marks</i>	<i>9 – 10 marks</i>	
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.	- Thorough evaluation with critical analysis of trends, reliability, and validity. - Comparison with scientific expectations and secondary sources.	
	<i>1 – 2 marks</i>	<i>3 – 4 marks</i>	<i>5 – 6 marks</i>	<i>7 – 8 marks</i>	<i>9 – 10 marks</i>	
BIO11-8 describes single cells as the basis for all life by analysing and explaining cells' ultrastructure and biochemical processes	- 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.	
	<i>1 mark</i>	<i>2 marks</i>	<i>3 marks</i>	<i>4 marks</i>	<i>5 marks</i>	
TOTAL	/30	GRADE	PERCENTAGE	%	RANK	/16

COMMENT:

Materials

- **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

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).

