



*Let the mind manage the body  
Que l'esprit gère le corps*

**MAURITIUS  
EXAMINATIONS  
SYNDICATE**

**NCE 2024  
SCIENCE - BIOLOGY**

Subject code: N530

**EXAMINERS' REPORT**

April 2025

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# Introduction

The 2024 National Certificate of Education (NCE) Biology assessment aimed to assess students' understanding and application of core biological principles as per the Teaching and Learning Syllabus (MIE, 2024). The paper comprised a total of 50 marks, distributed across 5 questions with various question types designed to evaluate a spectrum of cognitive abilities.

The overall percentage pass in Science was 78.4%, which is the lowest since the introduction of the NCE assessment in 2020-2021. Analysis of student responses reveals some inconsistencies in the understanding and application of concepts learned, highlighting areas requiring further attention in both teaching and learning. The assessment aimed to not only assess factual recall but also the ability to interpret data, analyse information, and draw logical conclusions—essential skills for scientific literacy and future academic pursuits.

This report is based on the quantitative item analysis from a representative sample of scripts and the qualitative analysis of the responses provided by candidates during the marking exercise. Information about the performance of candidates, examiners' expectations, and areas of strengths and weaknesses is provided, as recommendations for improved performance are proposed.

## Key Messages

- The overall performance demonstrated a satisfactory grasp of fundamental biological concepts.
- While there was a decrease in the overall performance in Science, the performance of candidates in the Biology paper was satisfactory, with more than 24% of candidates scoring between 40 and 50 marks.
- However, significant areas for improvement were identified in the application of knowledge and critical thinking skills. While a significant number of candidates demonstrated a solid grasp of fundamental biological concepts and terminology, as evidenced by their success in recall-based questions, a considerable proportion struggled with higher-order thinking skills. This disparity highlights a need for a more nuanced approach to both teaching and assessment.
- In the open-ended questions, which accounted to approximately half the marks available in the paper, candidates had difficulties in expressing their answers in a clear and concise manner. Language continues to be a barrier for candidates. A few candidates even answered in French or in Creole.

- Furthermore, the examination revealed a reliance on rote memorization in many instances, rather than a deep understanding of underlying principles. Students frequently struggled to explain complex biological processes or interpret experimental data, indicating a lack of critical thinking and problem-solving skills. This points to the need for a shift towards pedagogical approaches that prioritise conceptual understanding and application over simple memorisation.
- A significant number of candidates did not attempt questions 4 and 5.
- As has been the case since the introduction of the NCE, calculators are allowed in the Science assessment. Candidates should be encouraged to bring their calculators. This will facilitate any calculations that have to be carried out, particularly in connection with magnification.

## General Comments

The mean mark scored by candidates on the question paper was 28.7 out of 50. While more than 24% of candidates scored between 40 and 50 marks, approximately 18% scored below 15 marks. With more than 25 marks allocated to objective-type questions or short-answer questions requiring a one-word answer, the low performance of 18% of candidates is a matter of concern.

## Specific Comments

The following provides specific comments on each question and each item of the 2024 NCE Biology question paper.

### Question 1- multiple choice question

Question 1 consisted of 10 multiple-choice items assessing mainly knowledge and understanding and covering all the topics in Grade 9. The mean mark scored by candidates was 7 out of 10. While items 3, 5 and 8 were well done by more than 75% of candidates, items 1 and 10 posed particular difficulty.

*Item 1: Which component of blood helps in blood clotting?*

*Answer: D- Platelets*

Only about 60% of candidates circled the correct answer. The three distractors were equally popular wrong answers provided by candidates. This suggests that students had difficulties in recalling the functions of the different components of the blood.

*Item 2: Fig 1.1 shows a section through an artery.*

*What does X in Fig 1.1 represent?*

*Answer: A- A small lumen*

7 out of 10 candidates gave the correct answer. Distractor B- a large lumen was a popular wrong answer. This suggests that candidates correctly identified part X as the lumen of the artery but did not make the distinction between the large lumen of the vein and the small lumen of the artery.

*Item 3: Fig 1.2 represents the process of asexual reproduction.*

*Which one of the following will reproduce asexually?*

*Answer: A- Amoeba*

This was the most correctly attempted item in Question 1, with approximately 86% of candidates getting the right answer. The drawing provided was that of the amoeba and strongly guided the candidates towards the right answer. The distractors – Cats, Elephants, and Pigeons – were wrong to those who made the distinction between sexual and asexual reproduction.

*Item 4: Which one of the following is a sexually transmitted disease?*

*Answer: C- Gonorrhoea*

About three-quarters of the candidate population circled the correct answer. Cholera and COVID-19 are communicable diseases, but not sexually transmitted, whereas Stroke is a non-communicable disease.

*Item 5: Which one of the following may lead to an increase in the spread of AIDS?*

*Answer: D- Sharing contaminated needles among drug users*

This item was well answered by the majority of candidates. However, more than 13% opted for option C- Using condoms during sexual intercourse. This mistake is most probably due to inattention when reading the question.

*Item 6: Fig 1.3 shows the front view of the female reproductive system.  
Which part of the female reproductive system produces eggs?*

*Answer: A- Ovary*

This item was generally well-answered.

*Item 7: Which one of the following can be estimated using a quadrat?*

*Answer: A – Algae*

Most candidates circled the correct answer though 1 out of 10 candidates gave option C- Dogs as answer.

*Item 8: Which green pigment, present in leaves, traps light energy?*

*Answer: B- Chlorophyll*

This item was also a popular one with at least 8 out 10 candidates giving the correct answer.

*Item 9: Fig 1.4 shows the structure of a leaf.*

*What do P and Q represent?*

*Answer: D – P represents the leaf margin and Q represents the midrib of the leaf.*

A significant number of candidates did not get the correct answer. More than 25% of candidates circled options B and C. This suggests that the structure of the leaf is not fully grasped.

With the de-loading of the syllabus that happened in 2024, particularly in the chapter Nutrition in Plants, some students may not have covered or revised this particular part of the syllabus.

Some candidates were also not familiar with the answers provided in the table. Some of the common mistakes noted were:

- Candidates did a matching in the table, which indicated confusion regarding the interpretation of the table.
- Some candidates labelled the leaf instead of circling the right answer.

*Item 10: Why should a leaf be heated in alcohol before testing for starch?*

*Answer: C- To remove colour from the leaf.*

Only 39% of candidates opted for the right answer.

Many opted for A (to stop all chemical reaction in the leaf). Candidates do not fully grasp the steps involved in the preparation of a leaf to test it for starch. It is strongly advisable to carry out the experiment in the laboratory and explain not only the steps but also the reason why each step is carried out in this procedure.

To improve performance on the multiple-choice items, the following is proposed:

- Focus on conceptual understanding: Rote memorisation often suggests a superficial understanding of concepts. Using analogies, real-world examples, and case studies to illustrate concepts and their applications should help students to better understand these concepts. Students must understand the underlying why behind biological processes, not just the what.
- Practice with varied question types: Provide students with a wide range of MCQs, including those that test different levels of cognitive skills (recall, comprehension, application, analysis). Include questions with distractors that target common misconceptions. Moreover, provide different styles of MCQs, including those where the options are provided in a table or on a diagram.
- Develop relevant strategies in answering MCQs: Instruct students on effective strategies for eliminating the distractors and identifying keywords in the question stem.
- Regular quizzes and feedback: Regular, low-stakes quizzes can help students track their progress and identify areas where they need further support. Provide timely and specific feedback on incorrect answers, explaining the reasoning behind the correct option. Using wrong answers to consolidate the learning is a strong teaching method that can be used, particularly where learners may have misconceptions.

## Question 2

The concepts assessed in this question were: the stages of reproduction in humans, differentiating between sexual and asexual reproduction, and 2 examples of asexual reproduction in plants. The majority of candidates managed to attempt this question fully. The mean score as 4.9 over 7.

*Item (a): Candidates had to label stages A, B, C and D in human reproduction from Fig 2.1.*

*Answer: A – Egg/ Ova*

*B – Sperm cells/ Sperm/ Spermatozoide*

*C – Zygote*

*D – Foetus*

Many candidates correctly identified parts A and B but were unable to correctly label stages C and D. Some candidates gave foetus for stage C and zygote for stage D.

*Item (b)(i): Give one difference between sexual and asexual reproduction.*

*Possible answers:*

- Only one parent is involved in asexual reproduction, but two parents are involved in sexual reproduction;
- In asexual reproduction, new ones/ offsprings are genetically identical to their parents, while in sexual reproduction, new ones/ offsprings are genetically different from their parents;
- In asexual reproduction, fertilisation does not occur, while in sexual reproduction, fertilisation occurs

A majority of candidates scored the mark on this item.

Some candidates still have difficulty with the terms sexual and asexual. Some assumed that sexual reproduction occurs only in humans and animals, while asexual reproduction was limited to plants. Many vague terminologies were noted, such as partners, people, and cells instead of parents. Some answers referred to “identical” or “look like” instead of genetically identical.

*Item (b)(ii): Give two examples of plants that reproduce asexually.*

Answers: Spider plant/ potato/ garlic/ sugarcane/ Onions/ waterlily/ Ginger/ Banana/ Strawberry/ Moss/ seaweeds/ Bamboo/ rose plants/ Mango tree

There was a vast array of possible answers, as many plants can reproduce asexually either naturally or artificially. Some candidates did not pay attention to “plants” and referred to yeast, amoeba and fungi.

### Question 3

Question 3 assessed the topic of Biodiversity. Answers provided in this question were often vague, and the right terminology was not used. The mean score in this question was 6 out of 10, with the majority of the marks scored in part (a)(ii), which is an objective-type question with options provided. 6 marks were allocated to open-ended questions, and candidates often struggled to express themselves clearly.

*Item (a)(i): Define biodiversity.*

*Answer: Variety of life/species/plants and animals/organisms/living things; and their respective numbers on earth/ in (specific/ given) area/ ecosystem.*

It was important to mention that biodiversity concerns the variety of living species. The second important element was the number of these species living in a defined area.

Some complete definitions of biodiversity were obtained, while many others were incomplete answers. Some candidates copied the statement given in part (a)(ii) as the definition of biodiversity. The word environment was common instead of a defined area in their definitions. Candidates were also confused between the terms ecosystem and environment, which were used interchangeably. Many candidates also only mentioned the number of species and not the diversity or variety of different species. About half the number of candidates scored the 2 marks on this item.

*Item (a)(ii): Complete the table to indicate whether the following words are examples of natural calamities and human activities.*

*Answer:*

<i>Natural Calamities</i>	<i>Human activities</i>
<i>Cyclone</i>	<i>Pollution</i>
<i>Drought</i>	<i>Deforestation</i>

This item was generally well answered by the majority of the candidates. It was, in fact, the most scoring part of the whole paper, with more than 90% getting the 4 marks allocated.

*Item (b): Give two ecological benefits of biodiversity.*

*Possible ideas:*

- *plants roots help prevent soil erosion;*
- *maintenance of the balance of oxygen and carbon dioxide;*
- *microorganisms help in the decomposition of dead organisms/ waste matter, that improves soil fertility/ recycling of nutrients*

*Item (c): Give two socio-economic benefits of biodiversity.*

*Possible ideas:*

- *encourages recreational activities.*
- *promotes ecotourism;*
- *provides opportunities for education and research;*

Less than 3 out of 10 candidates provided the correct answers for both items. It was common to see that candidates could not differentiate between ecological and socio-economic benefits.

Others did not understand the term benefits and instead wrote on preventive or conservative measures of biodiversity. One-word answers were also common and were often not credited. Many answers were too vague to be awarded marks. Some candidates recopied the answers they gave to part (b) for part (c) and vice versa. This indicated that the terms “socio-economic” and “ecological” were unfamiliar to them.

These two items assessed knowledge. The benefits are given in the textbooks for students.

## Question 4

Question 4 was on the topic Blood Circulator System. The mean mark scored by candidates was 4.9 out of 11. The open-ended items and finding the magnification of the drawing posed some challenges to candidates.

*Item (a) (i) What does structure A represent?*

*Answer: Capillary*

The word capillary was frequently misspelt, otherwise, it was correctly identified by 7 out of 10 candidates.

*Item (a)(ii) Give the function of structure A.*

*Answer: Allows exchange of materials/named substances (e.g, oxygen, carbon dioxide, nutrients) between blood and cells in surrounding tissues.*

Only a few candidates were able to mention the idea of “exchange of substances,”. Answers to this item were often vague, relating only to the transport of blood. More general terms, such as “transmit, share, and spread blood,” were quite common.

Surprisingly, some candidates were not able to give the correct answer “capillary” to part a (i) but managed to state the function of the capillary to part (ii). They were credited for a correct answer.

*Item (b) Give two differences in the way arteries and veins carry blood.*

*Answer:*

- *Arteries carry blood under high blood pressure, but veins carry blood under low blood pressure*
- *Arteries carry blood away from the heart, but veins carry blood towards the heart.*
- *Arteries carry oxygenated blood (except the pulmonary artery), but veins carry deoxygenated blood (except the pulmonary vein).*

About 45% of candidates scored the two marks on this item. Many candidates gave structural differences between arteries and veins. Others simply referred to the function of

the arteries and the veins. Many incorrectly refer to the thickness of the walls and the sizes of the lumens without comparing the way the two blood vessels carry blood.

*Item (c) How is the stretching and recoiling of the artery walls known as?*

*Answer: Pulse*

The answer requested was the pulse. Only 37% of candidates gave the correct answer. Often, terms like valve, heartbeat, and heart rate were provided as answers. The term “elastic fibres” in some answers suggests that some candidates could not recall the exact term.

In a previous NCE Biology paper, candidates were requested to describe how a pulse is formed, and often a description of a heartbeat was given or sometimes the pulse was considered as a synonym of heartbeat. Overlap in terminologies used in everyday language and science may cause conceptual fuzziness. The distinction must be made in class so there is no misunderstanding.

*Item (d) State two factors that may increase the risk of coronary heart disease.*

*Correct ideas:*

- *High intake of salt in diet;*
- *High intake of (saturated) fats/ cholesterol/ ref. to fast food;*
- *Obesity;*
- *Less/no exercise;*
- *Smoking tobacco/cigarette;*
- *Stress;*
- *Consuming alcohol.*

Candidates answered relatively well to this question. Some explicit answers were obtained but some one-word answers were also provided by candidates. A few uncommon answers were about the prevention of CHD or its consequences rather than on the factors or risks associated with CHD. Some telescopic answers were found where the same idea was given in both answers.

*Item (e) White blood cells are important components of blood.*

*(i) Describe how white blood cells protect the body from germs.*

*Answers (Correct reference to):*

- *Engulf disease causing germs (bacteria) /phagocytosis;*
- *Produce antibodies that help to destroy germs/ pathogens/ named microorganisms*

This item required a description and carried two marks. As such, a simple phrase or one-word answer will not allow the candidate to score the two marks. Only about 20% of candidates scored two marks, and 23% scored one mark on this item.

Answers were often not specific, inaccurate or too vague, but those who mentioned engulfing of germs and the role of antibodies were awarded full marks.

*Item (e)(ii) Calculate the actual size of the white blood cells in Fig 4.2. Show your working.*

- *Correct measurement of diameter of image size in fig 4.2 = 51mm – 55mm*
- *Actual Size =  $54 \div 8000$*

$$= 0.0065\text{mm to } 0.00675\text{mm/ } 0.007\text{mm}$$

Only about 10% of candidates obtained two marks for this item. Some obtained only 1 mark for the correct measurement of the diameter of the white blood cell in Fig 4.2. Candidates who have shown the correct working without simplifying their answer also scored two marks.

Some candidates redrew the diagram and then calculated the actual size. It was rare to see the conversion of units from cm to mm, and with proper simplification of the final answer. Some candidates did not recall the formula for magnification.

This part revealed a general weakness in mathematical applications in Biology. Many failed to show working or convert magnification to actual size correctly.

Students should practice the use of the formula for magnification with different scenarios, that with problems involving finding the magnification, the actual size or the image size. They can use everyday items (e.g., magnified pictures of coins or insects) for visual learning. It is also important to reinforce unit conversion as part of lab-based learning.

## Question 5

This question assessed the chapter 'Nutrition in Plants'. This was the chapter that was the most de-loaded in 2024 with a number of learning outcomes related to transport in plants and leaf structure removed. The mean mark was 5.6 over 12. The items were based on an experimental setup as well as some concepts on photosynthesis.

*Item (a) Leaves contain small pores.*

*(i) How are the small pores in the leaves called?*

*Answer: Stomata/ Stoma*

Though a one-word answer, only a significant number of candidates could not give the correct answer. Some common wrong answers were: pores, holes, leaf apex.

*Item (a)(ii) What is the function of the small pores?*

*Answer:*

*They allow exchange of gases/ or allow the leaf to transpire/ Transpiration/ loss of water (vapour)*

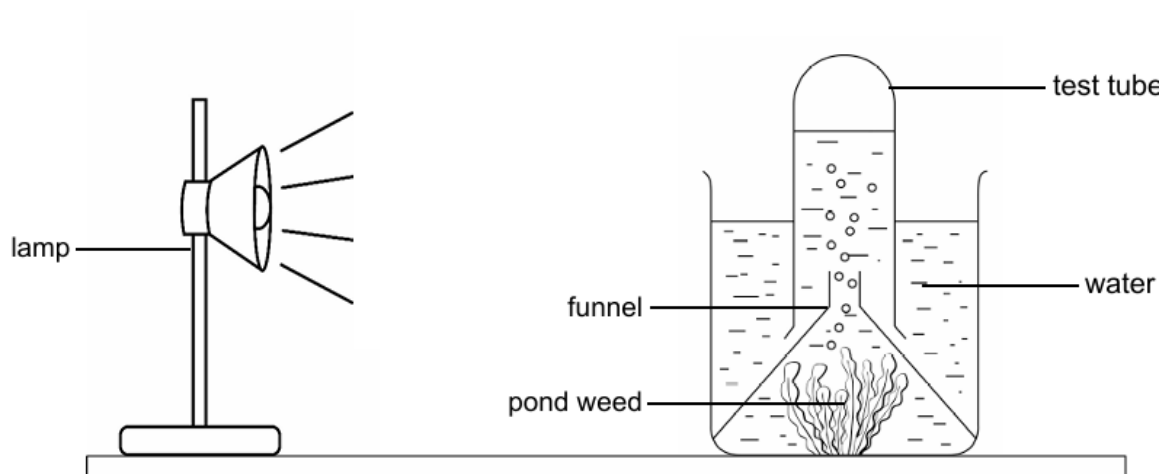
More candidates were able to provide a correct function of the stomata in the leaves than to provide the term 'Stomata'. Some candidates were confused between plants and animals, with answers related to "breathing" or "respiratory function".

Students should be provided the opportunity to visualise the stomata of plants through the microscopes to better understand them. Drawing comparisons between animal lungs and plant leaves to contrast mechanisms of gas exchange can also help to differentiate.

*Item (b)*

- (b) A student investigates the effects of light and carbon dioxide on photosynthesis.

Fig. 5.1 shows the set-up used for the investigation. The experiment is carried out in a dark room. The only source of light is a lamp.



**Fig. 5.1:** Experiment on photosynthesis

The student carries out the experiment four times. He records his findings in the table below each time.

Test	Conditions		No of bubbles of gas produced/minute
	Light	Carbon dioxide source	
1	Present	Absent	0
2	Absent	Present	0
3	Present	Present	20
4	Absent	Absent	0

*Item (b)(i) Give one variable that needs to be kept constant in each experiment.*

*Possible Answer: Temperature or Light intensity or Length/ amount of pond weed*

The term variable was not familiar to many candidates. The idea of having to keep a variable constant in an experiment where a specific factor is being tested was also unfamiliar to candidates. This item was the worst-done item on the whole paper.

A better grasp of experimental design and analysis can greatly help students in understanding the setup. It is also important that students are familiar with the use of specific scientific terminologies that will be used as they progress in their studies.

*Item (b)(ii) Give two conclusions that the student can draw from this investigation.*

*Answer: Light is important for photosynthesis to take place.*

*Carbon dioxide is important for photosynthesis to take place.*

The experiment tested the effects of light and carbon dioxide on photosynthesis. Hence, any conclusion that can be drawn from this experimental setup will pertain to light and carbon dioxide only.

There was a major confusion in many answers as to the difference between an observation and a conclusion.

Students should be encouraged to design experiments and to carry out experiments. They should be able to understand why a hypothesis has to be formulated and that the experiment is actually testing this hypothesis. They should be encouraged to carry out observations and record these observations in a structured manner. They should understand that the results of the experiment lead to a conclusion.

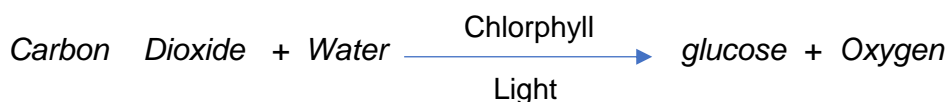
*Item (b)(iii) Give one way how the setup can be modified to increase the rate of photosynthesis.*

*Answer: Increase the light intensity or carbon dioxide concentration.*

This part was fairly well answered. Many mentioned replicating the experiment relating to the concept of reliability of the results. However, this was not the objective of this item. In a few scripts candidates provided answers related to the testing of the leaf for starch, which was not awarded marks.

*Item (c)(i) Complete the word equation to represent the process of photosynthesis.*

*Answer:*



This item carried 5 marks and is a concept that is familiar to candidates. It was generally well attempted by candidates.

*Item (c)(ii) What happens to the excess glucose during photosynthesis?*

*Answer: Converted to Starch*

Some candidates managed to suggest a correct fate of glucose in plants. Some referred to the same fate of excess glucose in humans, that is, it leads to diseases, and the plant would die.

## Conclusions and Recommendations

The emphasis once again is to familiarise candidates with using their knowledge in the context of the question. This proved to be a challenging task for many, suggesting that more practice at answering questions where they need to apply their knowledge and understanding, rather than simply recalling information, would be beneficial. Wherever possible, it is advised that candidates be given opportunities to analyse data provided in different formats, as this will help develop their problem-solving skills.

Candidates are advised to read the question before, during, and after answering it to ensure that they produce a full and relevant answer.

Some general recommendations to improve performance and score better marks are:

1. They must be encouraged to explain their reasoning, especially when it requires longer pieces of writing.
2. More practice on how to interpret a given situation and to answer concisely.
3. To be more familiar with using biological terms in the labelling of diagrams.
4. To read and draw simple tables and graphs correctly.
5. Language and mathematical skills must be improved with the proper biological methodology, such as for magnification.