

Candidate's Name:.....

Signature:.....

Random Number						Personal No.		

(Do not write your school name anywhere on this booklet)

553/1
BIOLOGY
Paper 1
(Theory)
May 2026
2¹/₂ Hours



For Scorer's Use Only

Total weighted score		
Initials		

CALVINE SCIENCE FOUNDATION
Eid-Adhuha Assessment
Uganda Certificate of Education
S.4 Biology
Paper 1
(Theory)
2 Hours: 30 minutes

INSTRUCTIONS TO CANDIDATES

This paper consists of two sections **A** and **B**.

It has **seven** examinable items.

Section **A** has **three compulsory** items.

Responses to section **A** **must** be written in spaces provided.

Section **B** has **two** parts: **I** and **II**. Respond to **one** item from each part.

Responses to section **B** **must** be written in the answer booklet(s) provided.

Responses to each item in section **B** should start on a fresh page.

Respond to **five** items in all.

Any additional items responded to will **not** be marked.

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Item No.	Basis Code	Weighted Score	Scorer's Initials
1	PU		
	PA		
2	CU		
	CA		
3	RU		
	RA		
_(4/5)	EU		
	EA		
_(6/7)	MU		
	MA		
Total Weighted Score			

SECTION A

Respond to **all items** in this section in the spaces provided

Item 1

Mukasa operates a commercial greenhouse in central Uganda where he grows high-value tomatoes. To maximize profits, he completely sealed the greenhouse vents to trap moisture and heavily applied synthetic chemical sprays to kill pests.

After three weeks, he noticed that despite regular watering, the tomato leaves become severely scorched, stunted and began turning yellow. Furthermore, water droplets stopped forming on the underside of the leaves during the day, and the soil remained strongly waterlogged. His overall fruit harvest fell by 70%

Task

- (a). *Mention the physiological process in the tomato plants that were directly affected by Mukasa’s greenhouse management choices.*

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- (b). *Describe how the sealed conditions and altered environment affected the internal transport and nutritional mechanisms of the tomato plants, leading to a poor yield.*

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(c). *Explain how the tomato plants might naturally attempt to adjust their structures or functions to survive this environmental stress if the vents remained closed.*

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Item 2

Alanya was walking home from school at dusk when a large aggressive stray dog jumped out of a bush and barked loudly at her. Instantly, her eyes dilated, her breathing rate spiked, and she felt a sudden rush of energy that allowed her to climb a nearby high brick wall a feat she had never managed before. After sitting safely on top of the wall for ten minutes, she noticed her heart rate gradually slowing down, her muscles relaxing and she began to shiver as the cool evening wind blew.

Task

(a). *Identify the changes that occurred in Alanya’s body systems immediately when she encountered the aggressive dog.*

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Anemia, a genetic condition that causes chronic fatigue and severe joint pain due to abnormal hemoglobin.

Kato is furious and blames Babirye entirely, claiming that because his own family has no history of the disease, Babirye must have brought the condition into the lineage. He is demanding a divorce. A medical counselor tests the couple and reveals that both Kato and Babirye have perfectly normal red blood cells but carry the sickle cell trait. (HbA HbS)

Task

- (a). Explain why Kato’s claim is biologically incorrect and advise him on why divorcing Babirye will not change the genetic reality.*

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- (b). Using appropriate genetic diagrams, show how Waiswa inherited Sickle Cell Anemia from his healthy parents.*

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(c). *What options and management practices should Kato and Babirye adopt to support Waiswa's growth, development and overall well-being?*

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SECTION B

PART 1

Respond to only one item from this part.

All responses must be written in the answer booklet(s) provided.

Item 4

A large wetland ecosystem in Eastern Uganda has recently been encroached upon by local developers. They have drained the water to set up a commercial rice scheme, burned the surrounding native papyrus vegetation, and introduced alien predatory fish species into the remaining channels to start aquaculture.

Within a year, the local communities downstream complain that their wells have dried up, frequent flash floods destroy their homes during rains, and native fish populations have completely disappeared.

Task

Explain to the developers and the local community

- (a). How the human activities in the wetland have disrupted the ecological balance and caused these environmental challenges.*
- (b). Why it is critically important for the community to restore and sustainably conserve this wetland resource.*

Item 5

An isolated forest reserve known for its biodiversity of lower plants, unique insects, and rare flowering trees is opened up for infrastructure development. Heavy machinery clears wide paths through the forest, fragmenting the habitat into small,

isolated patches, fearing attacks from wild bees and wasps, the construction workers spray broad-spectrum insecticides across the entire forest floor.

Task

Explain

- (a). The short-term and long-term impacts of these actions in the classification groupings, diversity and survival of the living organisms in this forest ecosystem.*
- (b). Sustainable strategies that the construction company can implement to preserve the natural resources while continuing their project.*

PART II

Respond to only one item from this part

All responses must be written in the answer booklet(s) provided

Item 6

Opio a successful athlete, celebrated a marathon victory by consuming a heavy meal rich in fried pork, cassava and sugary sodas. A few hours later, while celebrating, he was involved in a motorcycle accident where he suffered deep abdominal trauma and severe chest bruising.

At the hospital, doctors noted that he was breathing rapidly and exercising intense pain in his upper right abdomen. Lab results showed that his blood oxygen levels were very low despite his rapid breathing.

Task

- (a). Explain how Opio's accident and internal injuries compromised his respiratory and circulatory systems' capacity to meet his body's energy requirements.*
- (b). Describe how Opio's digestive system will process, breakdown and transport the nutrients from his celebratory meal to his cells given his current physiological stress.*

Item 7

Nakitende lives in an arid, semi-desert region of Uganda. Due to severe water shortage, she went 36 hours without drinking water while walking long distances under the hot sun to find help.

By the time she reached the hospital, she was dizzy, her skin felt dry and hot, and she had passed only a tiny volume of thick, dark yellow urine.

Task

- (a). *Explain how Nakitende body adjusted its homeostatic and excretory functions to conserve water and regulate her internal temperature during her journey.*
- (b). *Describe the physiological consequences her kidneys and cells will face if she continued to remain dehydrated without medical intervention.*

END
Eid Mubarak