

Candidate's Name.....

Signature.....

Random No.						Personal No.		

*(Do not write your School/Centre Name or Number anywhere on this Booklet.)*

553/1

**BIOLOGY**

**PAPER 1**

**2024**

2½ hours

**Uganda Certificate of Education**

**BIOLOGY**

**Paper 1**

Theory

**2 hours 30 minutes**

**INSTRUCTIONS TO CANDIDATES:**

*This paper consists of **seven** examination items. It has two sections; **A** and **B**.*

*Sections **A** has **three** compulsory items.*

*Section **B** has two Parts; **I** and **II**. Answer **one** item from each part.*

*Answer **five** items in all.*

*Any additional item(s) answered will not be scored.*

1. In the village of Nyakaton located in Kabale District, local farmers predominantly cultivate cabbage and bean plants. However, the village recently faced a prolonged dry spell followed by strong winds which brought a significant amount of dust that settled on the leaves and stems of cabbage and bean crops. The farmers are worried that if this problem persists, it could lead to severe losses in their harvests.

Task:

- a) Identify the specific processes and plant parts affected by the dust. (3 scores)

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- b) Explain how the functioning of these plants is affected and the roles of the affected parts/processes. (6 scores)

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- c) Propose solutions that the farmers of Nyakaton could implement to overcome the challenge posed by dust on their crops. (3 scores)

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2. Peter is preparing a meal while enjoying a few drinks with friends. After several hours of socializing and consuming alcohol, he decides to warm some milk for his evening tea. As he reaches for the saucepan on the stove, he accidentally touches the side of the hot pan. He doesn't react in anyway but realises later that he got a burn in the process.

Task:

- a) Identify the key processes and body parts involved in that incidence, including the roles of sensory receptors, nerves, and the spinal cord. (6 scores)

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- b) Analyse the biological problems that arise from Peter's alcohol consumption. (3 scores)

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- c) Discuss how the body normally overcomes such challenges through reflex actions and describe potential strategies or interventions that Peter could take to minimize the risks associated with alcohol consumption in dangerous situations like cooking. (3 scores)

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3. In a small neighbourhood, 15-year-old Sosipatra, influenced by her peers, innocently engaged in sexual acts with several boys and became pregnant with a baby girl. After her baby's birth, it was discovered that the baby has a hereditary disease of excessive bleeding when injured, raising concerns about hereditary health issues. As news spread, two families were implicated, and Sosipatra's family sought to identify the baby's biological father to understand potential hereditary risks and ensure proper support.

Task:

- a) Through genetic crosses, show how the right father can be established assuming that the genes for the condition are sex linked. (6 scores)

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b) Help Sosipatra and her peers understand the dangers of early pregnancy and the importance of understanding body changes during adolescence. (3 scores)

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c) Advise Sosipatra on what she needs to do to ensure that her life is not wasted. (3 scores)

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## SECTION A

### Part I

*Answer only one item from this part. Answers should be written in the answer booklet(s) provided.*

4. In Uganda, the beautiful landscapes are home to diverse ecosystems that provide vital natural resources. However, increasing human activity, such as illegal poaching and deforestation for agricultural purposes, has begun to take a toll on these precious environments. The beautiful forests of Bwindi Impenetrable National Park, a UNESCO World Heritage Site, are known for their rich biodiversity, including endangered species like the mountain gorilla. Nonetheless, the pressures of land reclamation for farming and unsustainable logging practices have led to significant ecological disruption.

**Task:**

Explain the effects of such human activities highlighting the natural resources at risk of being affected and what can be done to reverse the effects. Discuss the benefits of preserving such a UNESCO World Heritage Site emphasizing the importance of biodiversity and ecosystem health.

5. In villages of Sembabule, swamps have been cleared for cattle farmlands and sand mining. The resident district commissioner (RDC) organized a community sensitization campaign on sustainable use of natural resources in swamps. Unfortunately, Raphael a resident of the area arrived late and only heard the concluding remarks, “..... *I kindly request everybody to use our natural resources sustainably.*”

**Task:**

Explain to Raphael the environmental problems likely addressed by the RDC and how they can be solved. Explain why the village should conserve the natural resources in the swamps.

### Part II

*Answer only one item from this part. Answers should be written in the answer booklet(s) provided.*

6. 16-year-old Alex, fascinated by the human body, plays a football match in his rarely washed dirty shirt after several days of dehydration. During the game, he notices his salty sweat and is alarmed to find his urine deep brown afterward. After drinking plenty of water, he is surprised to see it clear a few hours later and wants to understand how this happened.

**Task:**

Help Alex understand how it happened and the potential risks to his health and organs in the body. What does one need to do to avoid risks Alex is facing?

7. Two Ugandan Towns **A** and **B** each have industries that release carbon dioxide gas, smoke and dust. The levels of air pollution in the two towns are as shown in table 1.

Table 1: levels of air pollution in two towns **A** and **B**.

Town	Level of air pollution (units)
A	30
B	70

(According to **American Lung Association**, 2023, *the normal range of air pollution is 0 – 50 units*).

Samuel was living in town **A**. He used to jog everyday, and would experience normal changes in his body during and after jogging. When he shifted to town **B**, he continued with his usual routine of jogging. However, he started experiencing complications such as difficulty in breathing, chest pain and coughing.

**Task:**

Explain to Samuel his experiences while living in town **A** and the new ones encountered in town **B**. Advise Samuel on how to manage the challenges experienced in town **B**