UGANDA ADVANCED CERTIFICATE OF EDUCATION

BIOLOGY
Paper 1
Advanced Secondary Curriculum Sample Examination, 2026

Time: 1 hour 40 minutes

INSTRUCTIONS TO CANDIDATES

This paper consists of two sections: A and B.

Section A consists of two compulsory items. Answer ALL items in this section. All answers for Section A MUST be written in the spaces provided in this question paper.

Section B consists of two optional items. Answer only ONE item from this section. Answers for Section B MUST be written on the answer sheets provided.

SECTION A

Answer ALL items in this section. Write your responses in the spaces provided.

ITEM 1

David, a key player for his school's football team, suffers a painful ankle injury during a match, which results in significant swelling. To manage his condition, the school nurse provides him with diclofenac. The nurse explains that the swelling and pain are triggered by signalling molecules produced by an enzyme in the body called Cyclo-oxygenase-2 (COX-2). According to the pharmacological notes, diclofenac works by binding to a location on the COX-2 enzyme that is completely separate from where the normal substrate binds, altering the enzyme's overall shape.

Tasks:
(a) Analyse how the drug provided by the school nurse biologically relieves David's symptoms. (8 scores)
(b) Evaluate the effect of naturally increasing the concentration of the enzyme's normal substrate in David's body on the efficacy of the drug. (6 scores)
(c) Propose an evidence-based biological strategy the school nurse could use alongside the medication to further manage the condition and accelerate tissue recovery. (6 scores)

Responses for Item 1:

(Candidate writes in the spaces provided below)

ITEM 2

Aisha, a young child from a village in Masaka, accidentally spills a pot of boiling water on her forearm, causing a severe burn. Her mother rushes her to the local health centre. The doctor assesses the injury and notes that the boiling water has completely destroyed the outermost layer of the skin, exposing the underlying tissues to the external environment.

Tasks:
(a) Identify the specific type of tissue that was destroyed on Aisha's forearm and analyse its adaptations that enable it to perform its functions. (8 scores)
(b) Evaluate the immediate physiological and cellular dangers Aisha's body faces as a direct result of the accident. (6 scores)
(c) Propose an evidence-based strategy the health centre should implement to prevent complications and promote tissue repair. (6 scores)

Responses for Item 2:
(Candidate writes in the spaces provided below)

SECTION B

Answer only **ONE item** from this section. Write your responses on the separate answer sheets provided.

ITEM 3

A nutritionist is counselling a patient who has been on an extreme, self-prescribed diet for several months in an attempt to lose weight rapidly. A review of the patient's food diary confirms a near-total absence of all fats and oils. The patient presents to the clinic complaining of "constant severe fatigue" that makes it hard to complete daily tasks, and "difficulty staying warm" even in mildly cold weather. The patient expresses fear of reintroducing these foods, believing that they are biologically harmful and solely lead to weight gain.

Tasks:
(a) Analyze the biochemical properties of the class of biomolecules missing from the patient's diet that directly account for the specific complaints presented at the clinic. (8 scores)
(b) Evaluate the biological dangers of the patient's extreme diet at the cellular level. (6 scores)
(c) Propose an evidence-based dietary strategy, recommending specific foods, and justify how it will safely address the patient's fears and reverse the symptoms. (6 scores)

ITEM 4

In a rural community, heavy agricultural runoff containing synthetic fertilisers and pesticides is heavily polluting the local freshwater ecosystems. A team of scientists investigating the water quality discovers a unique microorganism thriving in this highly polluted environment. Upon examining its ultrastructure, they note that it completely lacks a nucleus and membrane-bound organelles. However, its outer boundary regulates nutrient uptake while blocking the toxins. Advanced microscopy indicates that continuous exposure to the highest concentrations of the pollutants causes observable structural changes to the fluidity and arrangement of this boundary over time.

Tasks:
(a) Classify the unique microorganism described and analyse how specific components of its outer boundary allow it to thrive in the polluted environment. (8 scores)
(b) Evaluate the potential physiological impact of the agricultural pollutants on the structural properties of the organism's boundary over time, as observed by the advanced microscopy. (6 scores)
(c) Propose an evidence-based biological strategy that the community could adopt to mitigate the environmental damage based on the scientists' findings. (6 scores)

RESPONSE FOR SECTION B ITEM(ATTEMPT ONLY ONE)

Additional Items and sheets of paper will NOT be considered