P530/2

BIOLOGY

PAPER 2

2½ hours

Mar-Apr 2023

Uganda Advanced Certificate of Education

BIOLOGY DEPARTMENT - 2023

SET THREE

PAPER 2

THEORY

2 hours 30 minutes.

INSTRUCTIONS TO CANDIDATES:

- ✓ Answer question one in section **A** plus three others from section **B**.
- ✓ Candidates are advised to read the questions carefully, organize their answers and present them precisely and logically, illustrating with well labeled diagrams where ever necessary.
- ✓ Write on the answer sheet, your name, index number and the questions attempted in their order as shown in the table.

QUESTION	MARKS
TOTAL	

SECTION A: (40 Marks)

Compulsory.

1. In an investigation to determine the effect temperature on the membrane fluidity. Observations made are expressed graphically in **Figure 1**.

   In another investigation, two blood samples, **A** and **B**, were stored at 4 °C for 5 days. Sample **A** was then stored at 37 °C for 24 hours. Glucose was added to sample **B**, which was stored at 37 °C for 24 hours. The potassium ion concentration in the erythrocytes was recorded. The results are shown graphically in **Figure 2**.

Figure 1

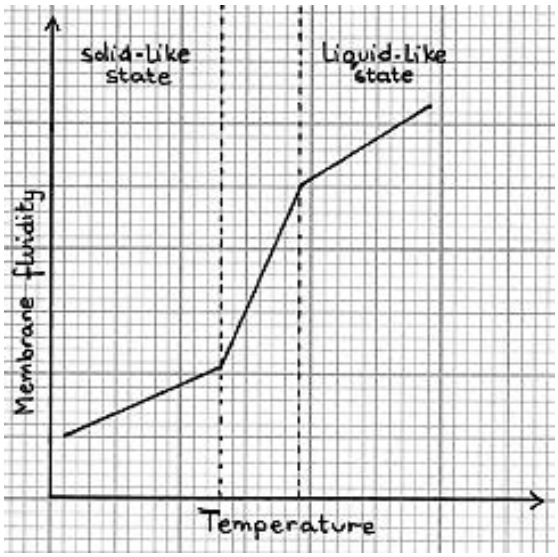
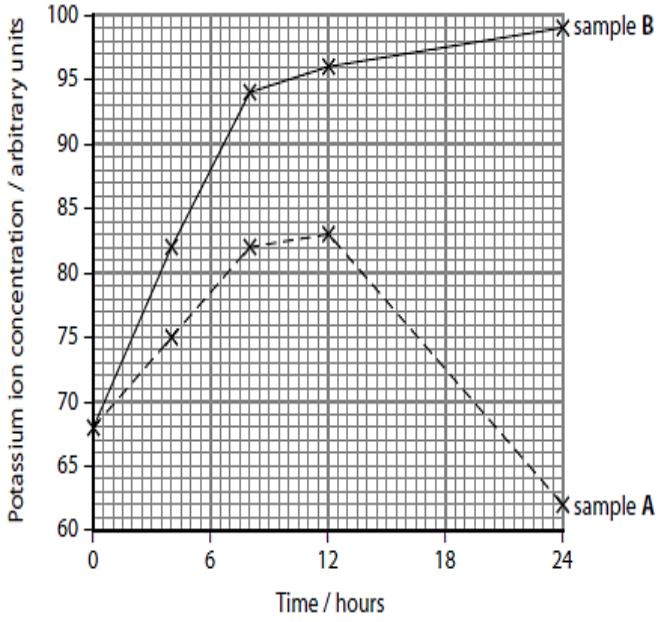


Figure 2



Using Figure 1:

a) Describe the relationship between membrane fluidity and temperature. **(05marks)**

b) (i) Explain the effect of temperature on membrane fluidity. **(10marks)**

(ii) How does the liquid-like state affect the permeability of the membrane? **(03marks)**

c) Account for the changes that would occur when 20% cholesterol is added to the plasma membrane. **(06marks)**

Using figure 2:

d) Compare potassium ion concentration in erythrocytes from sample A and B. **(05marks)**

e) Account for the differences above in (d). **(06marks)**

f) How does the removal of potassium ions from medium surrounding the erythrocytes in sample B affect the osmotic balance? **(05marks)**

SECTION B: (60 Marks)

Attempt only 3 questions from this section.

2. (a) Describe the sequence of events that may lead to eutrophication of a previously non polluted water body. **(10marks)**

   (b) Account for the difference in the efficiency of energy transfer at the different stages of transfer in an ecosystem. **(10marks)**

3. (a) Photosynthesis involves, the removal of electrons from chlorophyll, the splitting of water, the production of ATP, and reduction of cabondioxide. Explain concisely how these four process are linked in plants whose first stable intermediate product is a 3-carbon compound. **(15marks)**

   (b) Outline the physiological challenges by C3 plants that lowers productivity. **(05marks)**

4. (a) Explain the following body responses,

   (i) Pupils dilate **(03marks)**

   (ii) Heart beats faster **(03marks)**

   (iii) Blood pressure increases **(03marks)**

   (iv) Mouth goes dry **(03marks)**

   When the human body is frightened.

   (b) Give a brief illustrated account of how the female reproductive hormones affect their target cells. **(08marks)**

5. (a) Outline effects of removing whole liver on body's homeostatic mechanisms. **(08marks)**

   (b) Describe how the Carmel is able to overcome the following challenges in its habitat.

   (i) Water stress. **(06marks)**

   (ii) Heat stress. **(06marks)**

6. (a) What are isolating mechanisms? **(02marks)**

   (b) Explain how each of the isolating mechanisms lead to emergency of new species in a population. **(18marks)**

END