P530/2

BIOLOGY

(Theory)

Paper 2

JULY 2019

2½ Hours

Uganda Advanced Certificate of Education

BIOLOGY

(THEORY)

Paper 2

2 Hours 30 Minutes

INSTRUCTIONS TO CANDIDATES

This paper consists of **six** *questions.*

Answer question **one** *in section* **A** *plus* **three** *others from section* **B**.

Candidates are advised to read the questions ***carefully***, ***organise*** *their answers and present them* ***precisely*** *and* ***logically***, *illustrating with well labelled diagrams where necessary.*

SECTION A (40 MARKS)

1. A physiological experiment determined change in mass of Irish potato cylinders inserted in different sucrose concentrations for 4 hours.
Potato cylinders were divided into two groups, **A** and **B** each with nine cylinders.
Group **A** cylinders were each placed in a separate sucrose solution only, while group **B** cylinders were each placed in a separate sucrose solution containing gibberellic acid, which stimulates production of carbohydrase enzymes. The results are shown in fig. **1**.

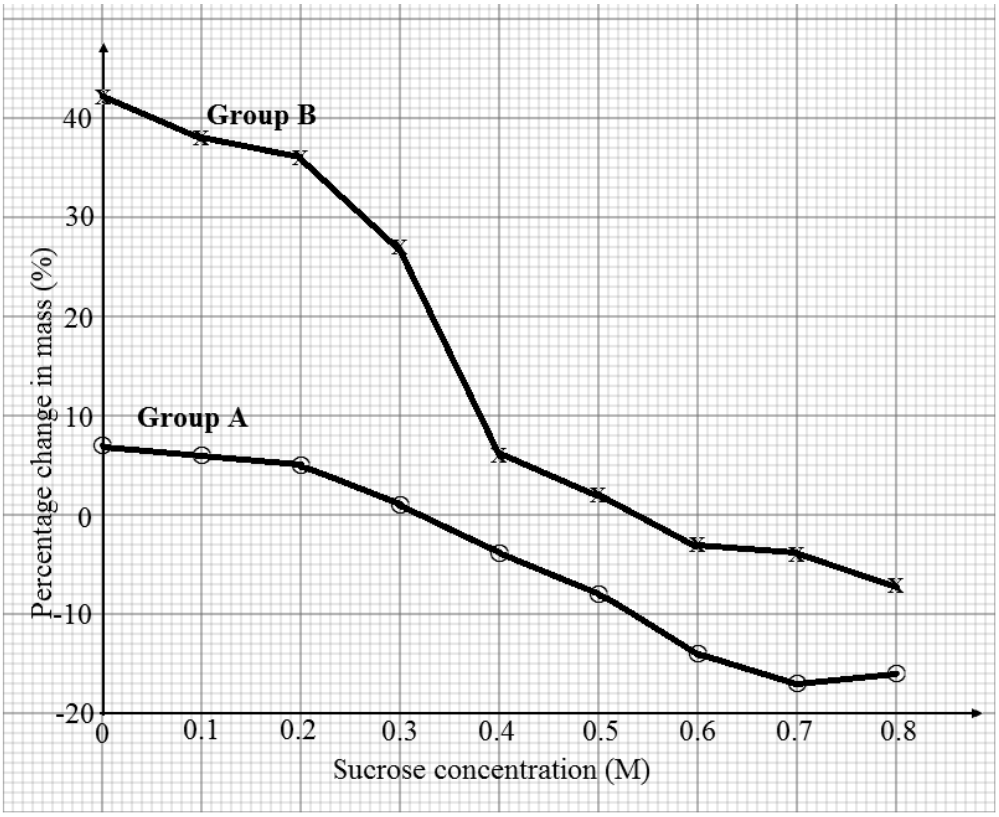

Fig. **1**

(a) Explain the effect of sucrose concentration on mass of potato cylinders. (*11 marks*)

(b) Compare the effect of sucrose concentration on mass of potato cylinders in groups A and B. (*08 marks*)

(c) Account for the differences in results for groups A and B of potato cylinders. (*08 marks*)

(d) From the information provided, suggest:
(i) how gibberellic acid can be useful to the growth of flowering plants. (*03 marks*)
(ii) the role of the physiological process under investigation to the plant. (*05 marks*)
(iii) and explain the sucrose concentration that is isotonic to the cell sap of potato cylinders in groups A and B. (*03 marks*)

SECTION B (60 MARKS)

2. (a) Explain
(i) why cell surface membranes are impermeable to most biological molecules. (*05 marks*)
(ii) how the products of digestion in the human ileum cross the surface membrane of epithelial cells. (*05 marks*)

(b) Describe the part played by each of the organelles involved in the production and secretion of the enzymes. (*10 marks*)

3. (a) With reference to a named examples, explain how limiting factors determine the final size of populations in nature. (*10 marks*)

(b) Explain
(i) how much of solar energy is **not** used in plant productivity. (*06 marks*)
(ii) the efficiency with which energy flows in an ecosystem. (*04 marks*)

4. (a) Distinguish between the following:
(i) **Primary** and **secondary** immune responses. (*03 marks*)
(ii) **Cell-mediated** and **humoral** immunity. (*04 marks*)

(b) Describe the mechanism by which phagocytes provide non-specific defense against pathogens in the body. (*05 marks*)

(c) Outline the role of **T** cells in cell-mediated immunity. (*08 marks*)

5. (a) Describe the structural changes that occur after fertilisation, leading to the development of the seed and fruit. (*10 marks*)

(b) Explain

(i) the functions of the testa and cotyledons in a seed. (*05 marks*)

(ii) how light affects germination in some seeds. (*05 marks*)

6. (a) Outline how the production of ATP occurs during oxidative phosphorylation. (*06 marks*)

(b) Explain the changes that occur within muscles in the first few minutes of strenuous exercise. (*10 marks*)

(c) Suggest ways in which physical fitness may benefit the body. (*04 marks*)

END.