Name ..... Adm No..... Class..... No..... Sign .....

NYABURURU GIRLS' NATIONAL SCHOOL

OUR LADY OF LOURDES

Date done	
Invigilator	
Date returned	
Date revised	

FORM 4 BIOLOGY 231/2

FEBRUARY SERIES 2016

TIME: 2 HOURS

Instructions

- Write your name, class and class number in the spaces provided.
- This paper consists of two sections A and B.
- Answer all the questions in section A in the spaces provided after each question.
- In section B answer question 6 (compulsory) and either question 7 or 8 in the spaces provided.

FOR EXAMINER'S USE ONLY

SECTION	QUESTION	MAX. SCORE	CANDIDADE'S SCORE
A	1	8	
	2	8	
	3	8	
	4	8	
	5	8	
B	6	20	
	7	20	
	8	20	
	TOTAL	**80**	

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SECTION A (40 MARKS)

1. Pure breed red and white flowered plants were crossed and the offsprings later selfed as shown.

Parent phenotype Red x White

↓

First filial generation

↓

Second filial generation

↓

1 Red:2 Pink:1 White

(a) Using letter R to represent gene for red flower and W for white flower, give the genotype of:

(i) Red flowers (1mk)

(ii) Pink flowers (1mk)

(b) State the colour of flowers in first filial generation. Give a reason for your answer. (2mks)

(c) If 30 white flowers were obtained in F2, how many had pink flowers. (2mks)

(d) What is meant by the following terms:- (2mks)

(i) Polyploidy

(ii) Genetic engineering

2. The equation below shows a chemical reaction that takes place in green plants.

   Carbon (IV) Oxide + Water $\longrightarrow$ Glucose + Substance B

   (a) Identify substance B. (1mk)

   (b) Name the metabolic process represented by the above equation. (1mk)

   (c) Other than the reactants, state two conditions necessary for this reaction. (2mks)

   (d) Give two types of cells where this process occurs in plants. (2mks)

   (e) How would the process (b) above be affected by the age of the plant? (2mks)

3. The table below shows approximate percent concentration of various components in blood plasma entering the kidney glomerular filtrate and urine of a healthy human being.

Component	Plasma	Glomerular filtrate	Urine
Water	90	90	94
Glucose	0.1	0.1	0
Amino acid	0.05	0.05	0
Plasma proteins	8.0	0	0
Urea	0.0	0.03	2.0
Inorganic ions	0.72	0.72	1.2

   (a) Name the process responsible for the formation of glomerular filtrate. (1mk)

(b) Explain why there are no plasma proteins in the glomerular filtrate. (2mks)

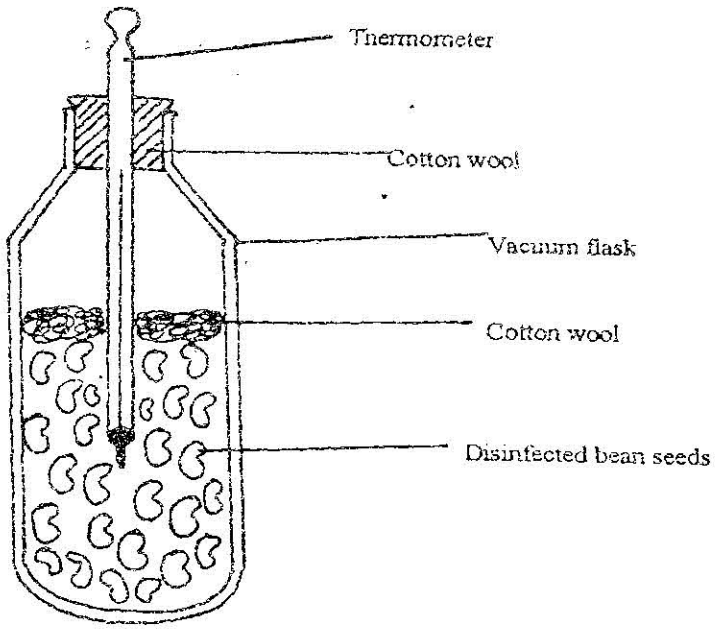
(c) Why is the concentration of urea in urine much higher than its concentration in glomerular filtrate. (1mk)

(d) Apart from plasma proteins, name other major components of blood that is absent in the glomerular filtrate. (1mk)

(e) Name the process that is responsible for the absence of glucose and amino acids in urine. (1mk)

(f) A nurse detected glucose in the urine sample of a patient. Explain what may have been the cause of this condition. (2mks)

4. In an experiment, disinfected soaked bean seeds were put in a vacuum flask which was then fitted with a thermometer as shown in the diagram below. The temperature reading was taken every morning for three consecutive days.



(a) Which process was being investigated? (1mk)

(b) (i) What were the expected results? (1mk)

(ii) Account for the answer in b(i) above. (2mk)

(c) Why were the seeds disinfected? (1mk)

(d) Why was the vacuum flask used in the set-up? (1mk)

(e) How would a control for this experiment be set? (1mk)

5. During an ecological field study, a group of students caught 240 grasshoppers, marked them and then released them back to the study area. After one day they caught 160 grasshoppers and found that 40 were marked.

(a) Work out the total population of the grasshoppers in the study area. (2mks)

(b) Identify the method used to capture the grasshoppers. (1mk)

(c) Name the instrument and chemical the students used to collect and mark grasshoppers. (2mks)

(d) State any three assumptions the students made during the study. (3mks)

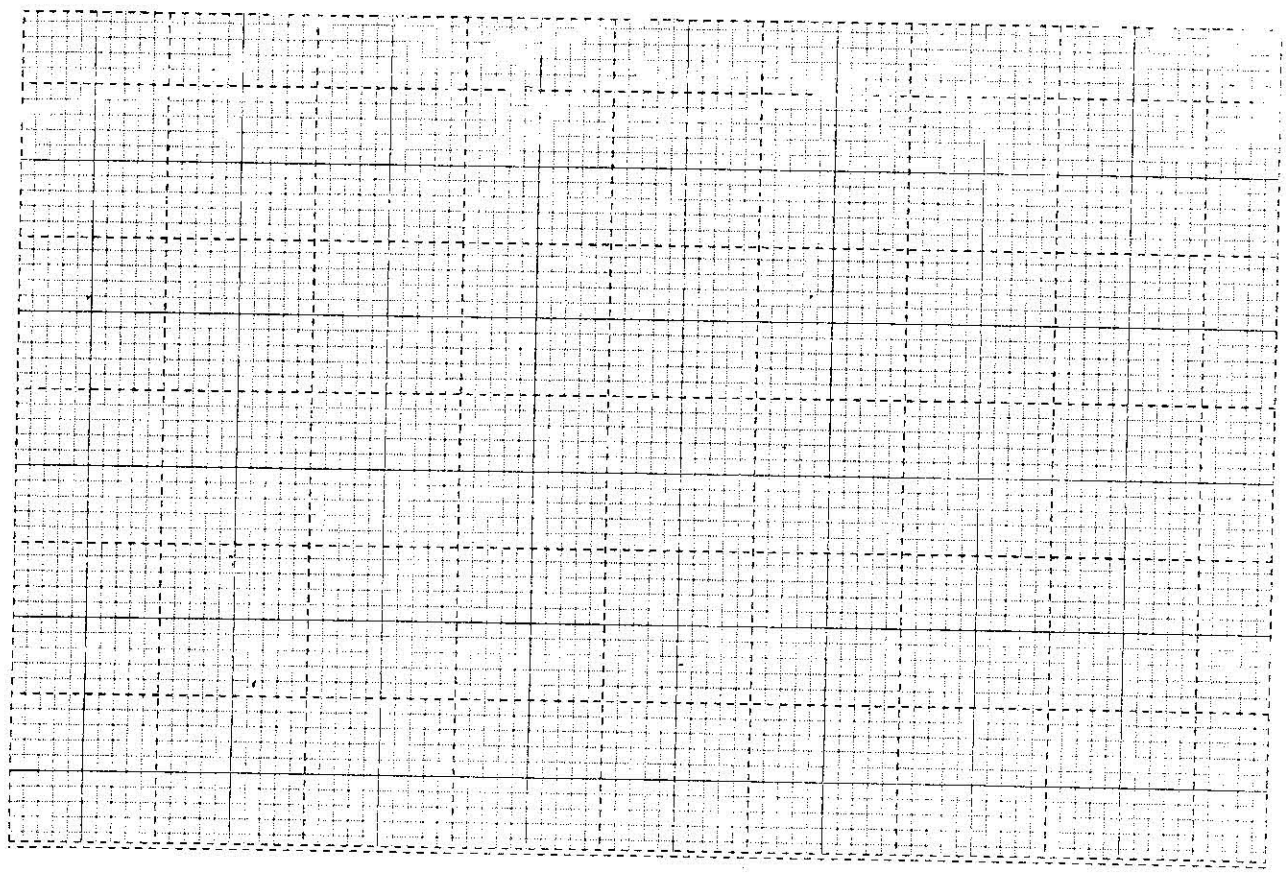
SECTION B (40 MARKS)

Answer question 6 (compulsory) and either 7 or 8 in the spaces provided after question 8.

6. An experiment was carried out to investigate plasmolysis in onion epidermal cells. The epidermal cells were placed in different concentrations of sodium chloride solution. The percentage of plasmolysed cells was determined after 30 minutes. The results were as shown in the table below.

Salt concentration gm per $100cm^3$ (%)	0.35	0.40	0.45	0.50	0.55	0.60	0.65
Onion epidermal cells plasmolysed (%)	0	10	30	68	82	92	100

(a) (i) On the grid provided plot a graph of plasmolysed epidermal cells against concentration. (6mks)



7. Describe various organic evidences that support evolution of living organisms. (20mks)

8. (a) Describe features of insect pollinated flowers. (6mks)
   (b) Describe the adaptations of xerophytes to their habitat. (14mks)

(ii) At what concentration of salt solution was the proportion of plasmolysed cells equal to non-plasmolysed cells? (1mk)

(iii) State the salt concentration at which 45% of the cells are plasmolysed. (1mk)

(b) Account for the results obtained at:

(i) 0.40 percent salt concentration (3mks)

(ii) 0.65 percent salt concentration (2mks)

(c) (i) What does the term plasmolysis mean? (1mk)

(ii) Name the process by which plasmolysis is reversed. (1mk)

(d) Does plasmolysis occur in animal cells? Explain. (2mks)

(e) What is the relationship between molar concentration of the salt solutions and the percentage of plasmolysed cells? (2mks)

(f) What term would describe a plant where 100% of its cells were plasmolysed? (1mk)