Paper 2

SECTION A (40 marks)

Answer ALL the questions in this section in the spaces provided.

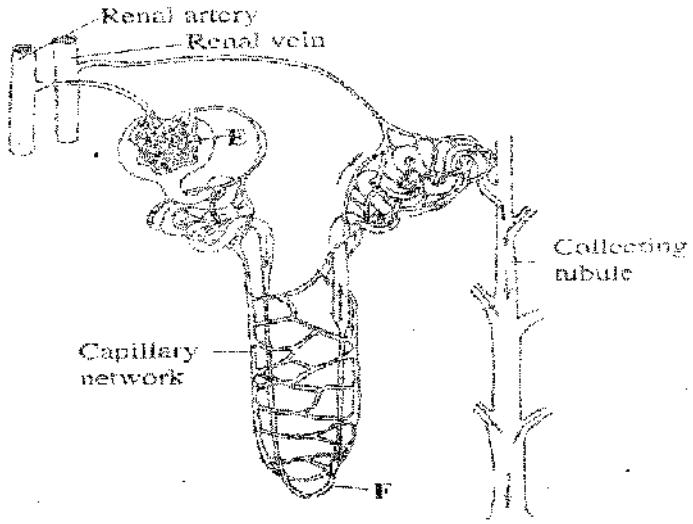
1. In a certain plant species which is normally green, a recessive gene for colour (n) causes the plants to be white in colour. Such plants die at an early age. In the heterozygous state, the plants are pale green in colour but grow to maturity.

(a) Give a reason for the early death of the plants with the homozygous recessive gene. (2 marks)

(b) If a normal green plant was crossed with the pale green plant, what would be the genotype of the first filial generation (F generation)? Show your working. (4 marks)

(c) If heterozygous plants were self-pollinated and the resulting seeds planted,work out the proportion of their offspring that would grow to maturity. (2 marks)

The diagram below illustrates the structure of the kidney nephron.



(a) Name the part labelled E.

(b) How is the part labelled F adapted to its function?

(c) State **three** physiological mechanisms of controlling the human body temperature during a cold day.

(a)In an investigation, equal amounts of water was placed in three test tubes labelled **G, H** and **J.** Pondweeds of equal. length were dropped in each test tube. The test tubes were then placed in identical conditions of light and carbon(IV) oxide at different temperatures for five minutes. After five minutes, the bubbles **produced in each test** tube were counted for one minute. The results were as shown in the table below.

Test tube	Temperature (°C)	Number of bubbles
G	20	28
H	35	42
J	55	10

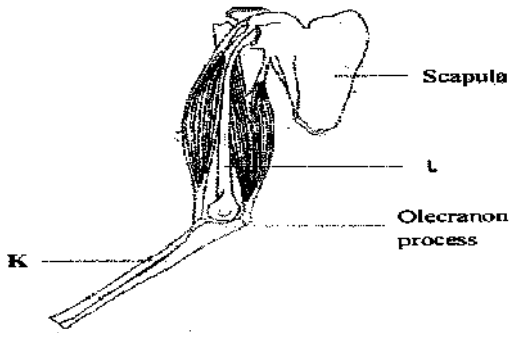
(i) Name **one** requirement for this process that is not mentioned in the investigation. (1 mark)

(ii) Name the gas produced in this investigation. (1 mark)

(iii) Account for the results in test tubes **H** and **J**. (2 marks)

(b) State **two** ways in which the human intestinal villus is adapted to its function. (4marks)

4. (a) The diagram below illustrates the arrangement of bones and muscles in the human arm.



(i) Name the bones labelled K and L. 2marks)

K.....
L.....

(ii) Explain how the upward movement of the lower arm is brought about by the bones and muscles shown in diagram above. (3 marks)

b) State **three** ways in which support is brought about in a leaf. (3 mark)

5. a) Describe the process of inhalation. (4marks)

b) Explain the mechanism of stomatal opening. (4marks)

SECTION B (40 marks)

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

6 The data provided below represent populations of a predator and its prey over a fifty years period.

TIME IN YEARS	POPULATION IN RELATIVE NUMBERS	
	POPULATION OF P	POPULATION OF Q
5 10	24500 30000	17000 20500

15	33500	26000
20	33500	30000
25	31000	33000
30	27000	32000
35	25000	30000
40	29000	27500
45	32500	28000
50	34000	28500

(a) (i) Using the same axes, draw graphs of the relative populations of P and Q against time. (7 marks)

(ii) With a reason, identify the curve that represents the prey.
(2 marks)

(iii) Account for the two populations between 25 and 32 years.
(2 marks)

(iv) Which years were the two populations equal?
(2 marks)

(v) Apart from predation, state **three** biotic factors that may have led to the decline of the prey population. (3 marks)

(b) Describe the hazards of air pollution by Sulphur (IV) Oxide.
(4 marks)

7. Using a relevant example in each case, describe simple and conditional reflex actions. (20 marks)

(a) Using a relevant example, describe how an allergic reaction occurs in a human being. (10 marks)

(b) Describe how environmental factors increase the rate of transpiration in terrestrial plants. (10 marks)