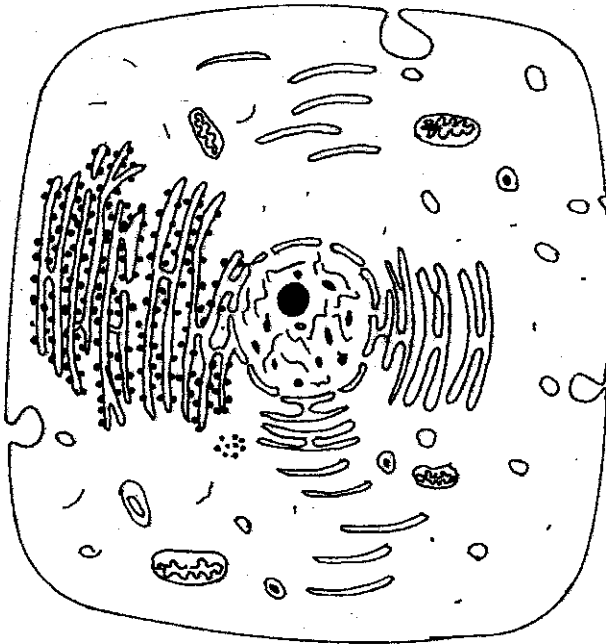


KCSE 2013 BIOLOGY PAPER 1

1. (a) What is meant by the term wilting? (1 mark)

(b) Explain how an increase in temperature affects the rate of active transport. (2 marks)

2. The diagram below represents a cell as seen under an electron microscope.



(a) Based on the diagram, state whether it represents an animal cell or a plant cell. (1 mark)

(b) Give two reasons for your answer in 2(a) above. (2 marks)

(c) Why is the palisade layer a tissue? (1 mark)

3. (a) State two external features found in the class Mammalia only. (2 marks)

(b) Name the taxonomic unit that comes immediately after a phylum in classification. (1 mark)

4. (a) State two roles of mucus in the stomach. (2 marks)
- (b) Explain how age determines a person's energy requirements. (2 marks)
5. Describe how turgor pressure builds up. (3 marks)
- 6 Using a microscope, a student counted 55 cells across a field of view whose diameter was $6000\mu\text{m}$. Calculate the average length of the cells. Show your working. (2 marks)
7. Explain how the following forces contribute to the movement of water up the xylem vessels; (2 marks)
- (a) cohesion;
- (b) adhesion.
8. Construct a step in a dichotomous key using two leaves one with a serrated and the other with a smooth margin. (2 marks)
9. State **one** way in which each of the following is structurally adapted to its function: (2 marks)
- (a) neurone;
- (b) mitochondrion, (2 marks)
- 10 How are lenticels adapted for gaseous exchange? (2 marks)
11. State the advantage of possessing blood group AB. (1 mark)

- 12 (a) A student collected an organism and observed the following features: simple eyes, four pairs of legs and two body parts.
- (i) State the class to which the organism belongs. (1 mark)
- (ii) Give an example of an organism in this class. (1 mark)
- (b) Name the kingdom to which plasmodium belongs. (1 mark)
- 13 State **two** characteristics of living organisms that are specific to plants. (2 marks)
- 14 Name the **three** end products of anaerobic respiration in plants. (3 marks)
- 15 State **two** reasons why accumulation of lactic acid leads to an increase in heart beat. (2 marks)
- 16 Name **three** mechanisms that ensure cross pollination takes place in flowering plants. (3 marks)
- 17 Name the flower part that produces gametes. (1 mark)
18. How is the human sperm cell structurally specialised? (2 marks)
19. State **three** factors in seeds that cause dormancy. (3 marks)
20. Explain the theory of evolution by natural selection. (2 marks)
21. (a) Explain the role of continental drift in evolution. (3 marks)
- (b) What is meant by the term organic evolution? (1 mark)

22. The diagram below illustrates a response by a certain plant.



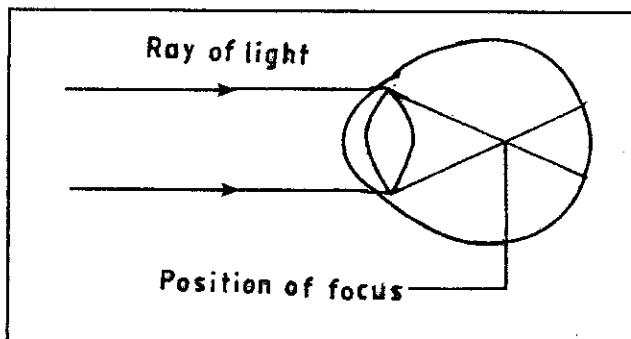
(a) Name the type of response.

(1 mark)

(b) Explain how the response illustrated above occurs.

(3 marks)

23. The diagram below illustrates a defect in the eye.



Explain how the defect illustrated above can be corrected.

(2 marks)

24. Explain **three** protective functions of mammalian blood.

(3 marks)

25 State **one** adaptation of xylem vessels to their function. (2 marks)

26 (a) What is meant by the term sex linked genes? (1 mark)

(b) Name **two** sex linked traits in human beings. (2 marks)

27. (a) State **two** differences between complete and incomplete metamorphosis. (2 marks)

(b) State the importance of moulting to an insect. (1 mark)

28 (a) State **two** features of a ball and socket joint. (2 marks)

b) Name the bone that allows the head to:

(i) nod;

(ii) turn side ways.

(2 marks)

29 . State two functions of pelvic girdle in mammals. (2 marks)

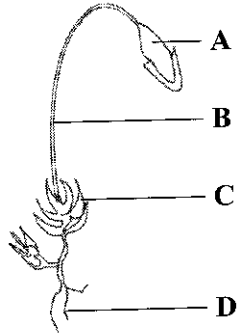
30. State **two** ways in which osmosis is significant to plants. (2 marks)

BIOLOGY PAPER 2

SECTION A (40 marks)

Answer **all** the questions in this section in the spaces provided

- 1 (a) The diagram below represents a plant in the division Bryophyta.



- (i) Name the parts labelled B and D. (2 marks)
B.....

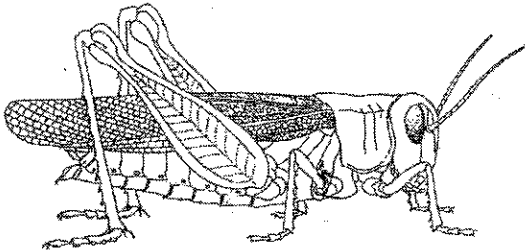
D.....

- (ii) State **one** function for each of the parts labelled A and C. (2 marks)

A.....

B.....

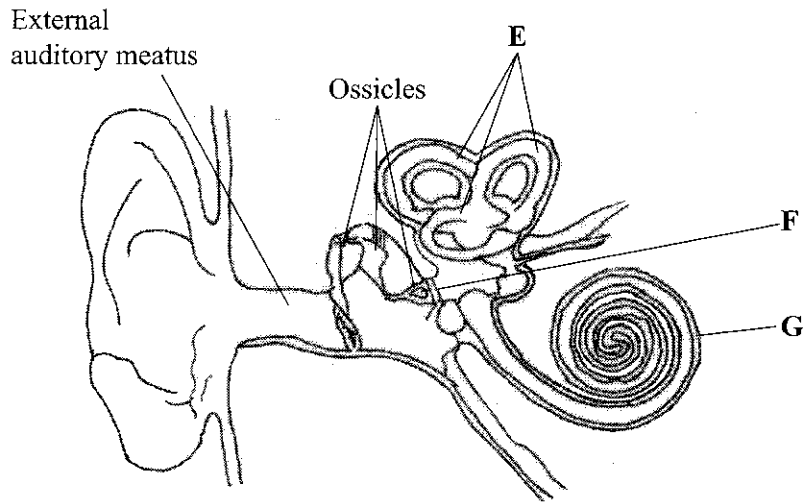
- (b) The diagram below represents a member of the kingdom Animalia.



- (i) Name the phylum to which the organism belongs. (1 mark)

- (ii) Using observable features in the diagram, give **three** reasons for the answer in b(i). (3 marks)

2. The diagram below represents the human ear.



- (a) Name the parts labelled **E**, **F** and **G**. (3 marks)

E.....

F.....

G.....

- (b) How is each of the following adapted to its function?

(i) External auditory meatus; (2 marks)

(ii) Ear ossicles. (2 marks)

(c) Name **one** defect of the human ear. (1 mark)

3 (a) Explain the importance of the following in photosynthesis: (3 marks)

(i) light;

(ii) carbon(IV) oxide;

(iii) chlorophyll.

(b) Name **one** appropriate food substance for each of the following enzymes: (2 marks)

(i) ptyalin.....

(ii) pepsin.....

(c) State the cause and two symptoms of Beri-beri.

Cause..... (1 mark)

Symptoms (2 marks)

i)

ii)

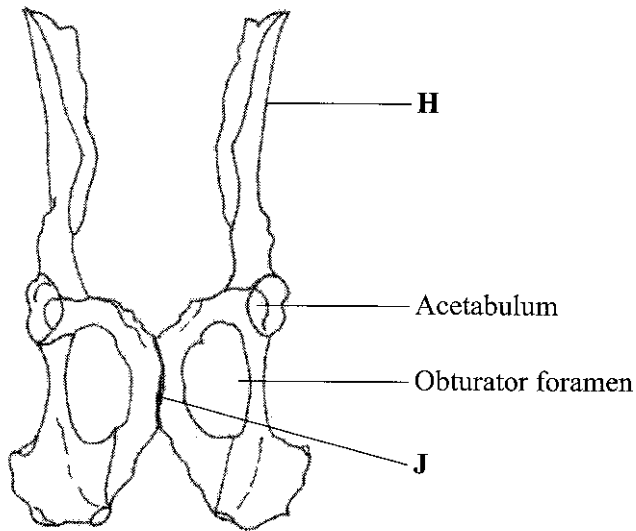
4. In an investigation, a variety of pea plants grown from seeds with smooth coats were crossed with plants grown from seeds with wrinkled coats. All the seeds obtained in the first filial (F_1) generation had smooth seed coats.

(a) Using the letter R to represent the gene for smooth seed coat, work out the genotype of the F_1 generation. Show your working. (3 marks)

(b) If the F_1 generation was selfed, determine the phenotypic ratio of the second filial (F_2) generation. Show your working. (3 marks)

- (c) If the total number of seeds in the F_2 generation was 14 640, calculate the number of seeds with wrinkled coats. Show your working. (2 marks)

5. The diagram below represents a mammalian pelvic girdle.



- (a) How are the structures labelled H and J adapted to their function?
- (i) H (2 marks)
- (ii) J (2 marks)
- (b) State the function of obturator foramen. (1 mark)
- (c) (i) Name the bone that articulates with the pelvic girdle at acetabulum. (1 mark)
- (ii) Name the type of joint formed by the acetabulum and the bone named in (c)(i) above (1 mark)
- (d) Name the bone formed by the fusion of caudal vertebrae in human beings. (1 mark)

SECTION B (40 marks)

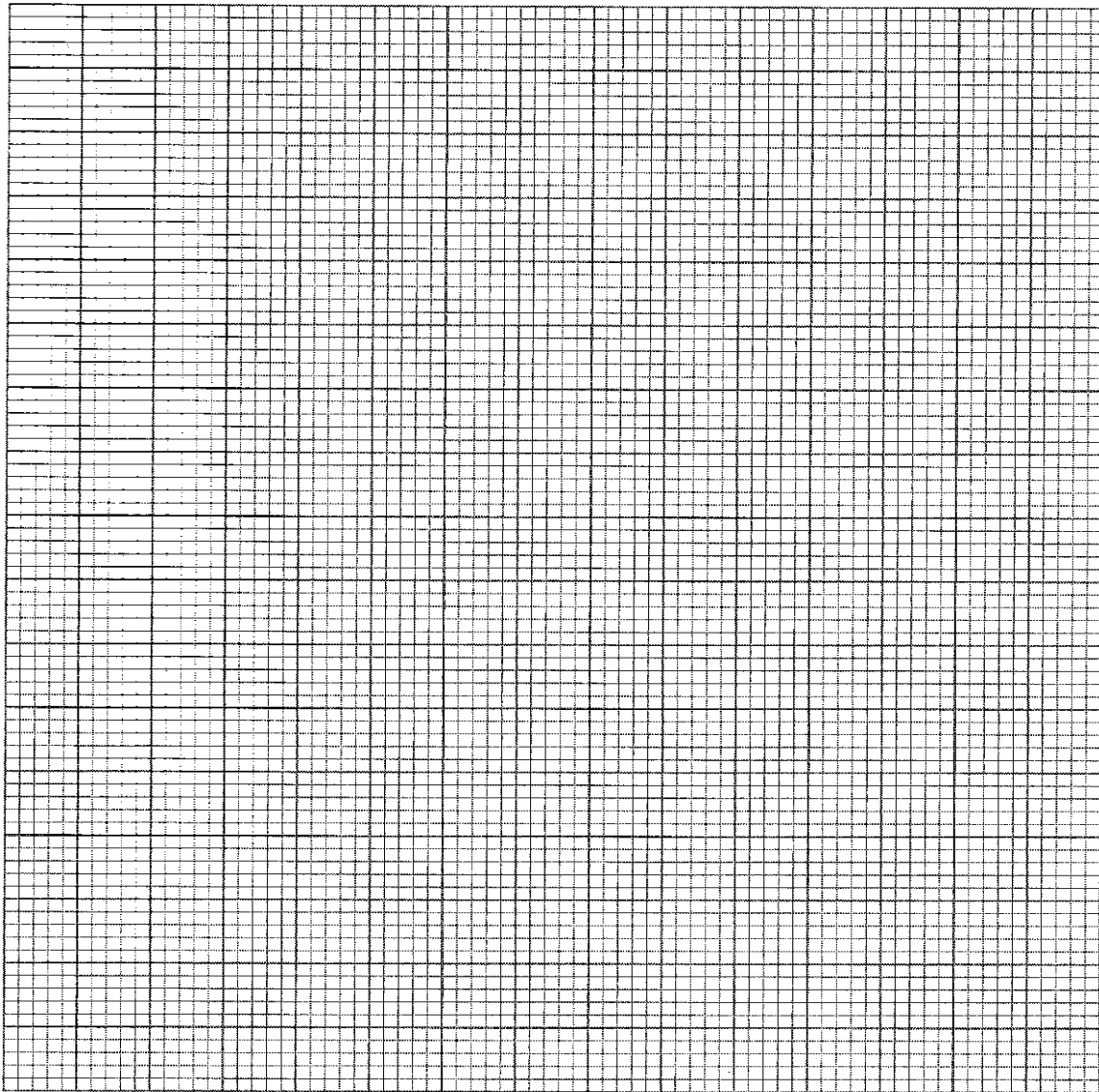
Answer question 6 (compulsory) and either question 7 or 8 in the spaces provided after question 8.

6. A scientist carried out an investigation to find out the population growth of mice under laboratory conditions. Twenty young mice were placed in a cage. The results obtained from the investigation were as shown in the table below.

| | | | | | | | | | |
|----------------|----|----|----|-----|-----|-----|-----|-----|-----|
| Time in months | 0 | 2 | 4 | 6 | 7 | 10 | 12 | 16 | 18 |
| Number of mice | 20 | 20 | 65 | 115 | 310 | 455 | 450 | 145 | 160 |

- (a) On the grid provided, draw a graph of the number of mice against time.

(6 marks)



- (b) Account for the changes in mice population between
- (i) 0 to 2 months (2 marks)
 - (ii) 2 to 6 months (2 marks)
 - (iii) 6 to 10 months (2 marks)
 - (iv) 10 to 12 months. (2 marks)
- (c) (i) Between which two months was the population change greatest? (1 mark)
- (ii) Calculate the rate of population change over the period in (c)(i) above. (2 marks)
- (d) What change in population would be expected if the investigation was continued to the 19th month? (1 mark)
- (e) To obtain the observed results state two variables that were kept constant during the investigation. (2 marks)
- 7 (a) Describe the process of blood clotting in human beings. (10 marks)
- (b) How are respiratory surfaces in mammals adapted to their functions? (10 marks)
- 8 Describe the role of the following organs in excretion and homeostasis.
- (a) the liver (10 marks)
 - (b) the skin during hot environmental conditions. (10 marks)

BIOLOGY PAPER 3

- 1 (a) The photograph below shows the inner surface of the upper left side of the rib cage.



- (i) Name the bone covered by the fatty tissue labelled **K**. (1 mark)
- (ii) Explain the role of the part labelled **M** in inhalation. (5 marks)
- (b) The photograph below shows a mammalian vertebra.



(i) State the view of the vertebra presented. (1 mark)

(ii) Name and state **one** function of the part labelled T.

Name..... (1 mark)

Function..... (1 mark)

(iii) How are the parts labelled **S** and **V** adapted to their functions? (4 marks)

S.....

V,.....

(c) The actual width of the vertebra below in cm is shown by a section of the ruler in the photograph.



- (i) Determine the width of the vertebra on the photograph. (1 mark)
- (ii) Calculate the magnification of this image. (2 marks)
- (iii) Determine the actual length of the vertebra from point A to B. Show your working. (2 marks)

2. You are provided with a food sample labelled solution **C**. Using the reagents provided, carry out tests to identify the food substances present in the sample.

| TEST FOR | PROCEDURE | OBSERVATION | CONCLUSION |
|------------------------|-----------|-------------|------------|
| 1. Reducing sugars | | | |
| 2. Non-reducing sugars | | | |
| 3. Proteins | | | |

(12 marks)

3 Below are photographs showing some observable features of leaves.

Compositae



Papilionaceae



Commelinaceae



Malvaceae



Nyctaginaceae



Bignoniaceae



Using the features in the order given below, construct a dichotomous key that can be used to identify the specimens.

- simple or compound leaves;
- leaf venation;
- leaf margin;
- arrangement of leaves on the stem;
- pinnate or trifoliate nature of leaves.

(10 marks)