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BIOLOGY KCSE PREDICTION 2021

Paper 1

FORM FOUR

Kenya Certificate of Secondary Education

231/1 BIOLOGY

PAPER ONE

TIME: 2HRS

INSTRUCTIONS

Answer **ALL** the questions in spaces provided.

SECTION A

1. A young scientist observed a bird laying her eggs in a nest and later the eggs hatched into chicks. Name three characteristics shown by the chicks that show a chick is a living thing but an egg is not
   (3mks)

   ……

   ……

   ……

2. Which organelles should be abundant in;
   i) Skeletal muscle (1mk)

   ……

   ii) Palisade tissue (1mk)

   ……

3. A form 1 student was preparing temporary slides in the laboratory, in the course of preparation he carried out the following processes;
   i) Sectioning
   ii) Fixation
   iii) Staining

   State the importance of the above processes
   (3mks)

   ……

   ……

   ……

4. Why are lysosomes many in phagocytic cells
   (2mks)

……

……

5. Differentiate between guttation and transpiration (2mks)

……

……

……

6. a) Give a reason why xylem vessel should be dead (1mk)

……

b)What is the role of lignin in the wall of the xylem vessel (1mk)

……

7. Name the disease of the blood characterized by,

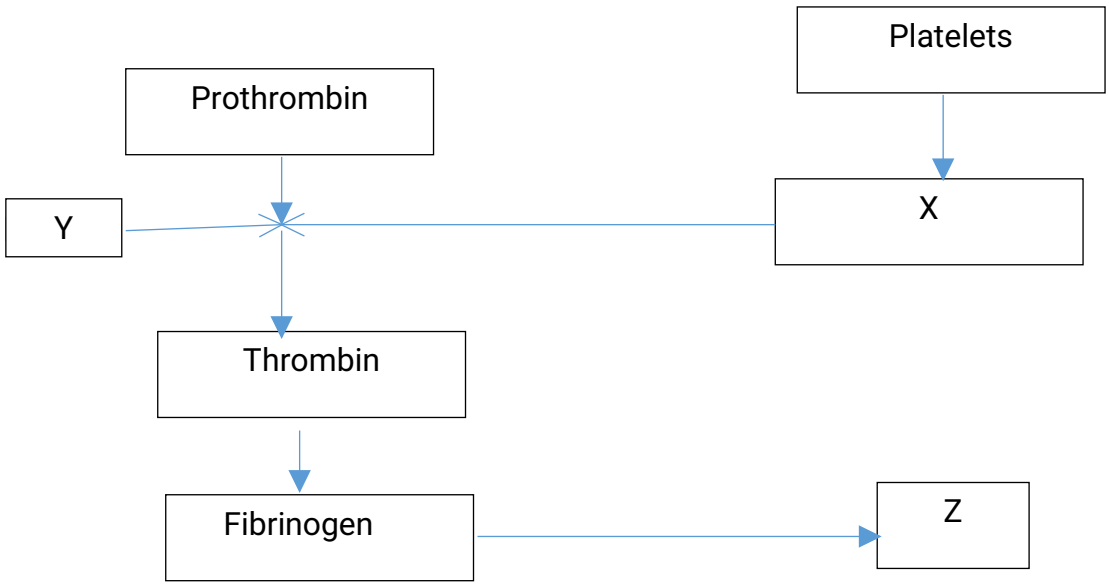
a) Abnormally large number of white blood cells (1mk)

……

b) Cresent –shaped haemoglobin (1mk)

……

8. The chart below is a summary of blood clotting mechanism in a man.



Name;

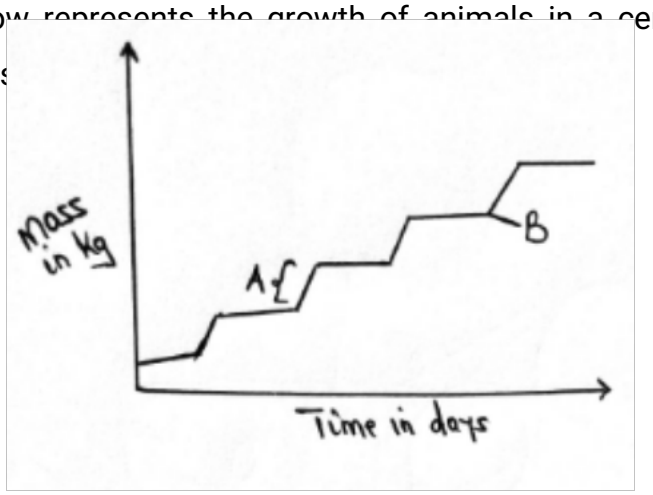
i) The metal ion represented by Y (1mk)

……

ii) The end product of the mechanism represented by Z (1mk)

……

9. The graph below represents the growth of animals in a certain phylum. Study it and answer the ques



a) Name the type of growth pattern shown on the graph (1mk)

……

b) Identify the process represented by letter B (1mk)

……

c) Name the hormone responsible for the process in (b) above (1mk)

……

10. Explain why a mule is infertile (1mk)

……

……

11. Phylum Arthropoda is the most successful of invertebrates. Explain two characteristics that make them most successful

(2mks)

……

……

……

12. Name phylum whose members possess a notochord

(1mk)

……

13. a) Define evolution and homologous structures (2mks)

……

……

……

b)State three limitations of using fossil records as an evidence that supports organic

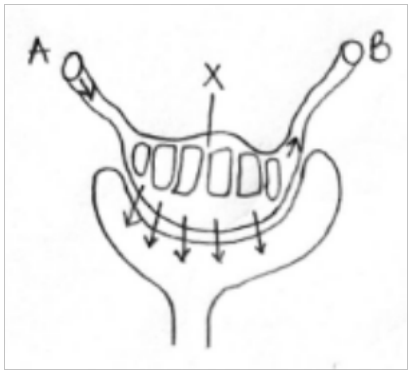
evolution (3mks)

……

……

……

14. The following is part of a kidney nephron



a) i)Name the process represented by the arrows (1mk)

……

ii) Name the conditions necessary for the process named in (a) (i) above to take place

(1mk)

……

b) Identify with a reason vessel A (1mk)

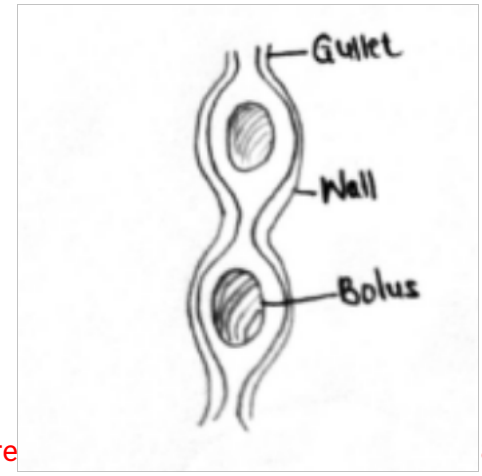
……

c) Name any two blood components that are present in vessel (A) but are absent in vessel B (2mks)

……

……

15. The diagrammatic representation below illustrates one of the process that occurs in mammals during feeding. Carefully study it and answer the following questions



i) Identify the process (1mk)

……

ii) State two structural adaptations of gullet to its functions (2mks)

……

……

iii) Name one enzyme already present in the food bolus within the gullet in man (1mk)

……

b) State two functions of mucus secreted by the intestines (2mks)

……

……

16. Explain each of the following;

a) Variegated plants accumulates less food than non-variegated plants under similar conditions. (2mks)

……

……

……

b) Most leaves are thin with broad leaf surface (2mks)

……

……

……

17. State the economic importance of the following plant excretory products (3mks)

a) Papain

……

b) Caffein

……

c) Colchicine

……

18. a) State two processes which occurs during anaphase of mitosis (2mks)

……

……

b)What is the significance of first meiotic division (1mk)

……

c)State two ways in which HIV/AIDS is transmitted from mother to child (2mks)

……

……

19. State the function of the following during pregnancy (3mks)

a) Amnion

……

b) Amniotic fluid

……

c) Umblical cord

……

20. Name the process by which;

i) Producers convert sunlight energy into chemical energy (1mk)

……

ii) Chemical energy is converted into heat energy by consumers (1mk)

……

21. Students from Mpesa foundation academy wanted to investigate the population of crabs in their school pond. They caught 50 crabs, marked them with white paint on the cephalothorax and then released them back into the pond. After three days, they came back and caught 50 crabs of which 3 had the white mark.

a) Using the data above, calculate the population of crabs in the pond (2mks)

b) Suggest three assumptions the students made during this study (3mks)

……

……

……

22. State any two methods that can be used at home to properly manage domestic effluents

(2mks)

……

……

23. a) Explain how the following factors increase the rate of diffusion

(3mks)

i) Temperature

……

ii) Diffusion gradient

……

iii) Size of diffusing particles

……

b) Diffusion is a passive process while active transport is an active process. Explain (2mks)

……

……

24. a) Waterlogging in terrestrial plants inhibit uptake of certain mineral ions from the soil by the plants. Explain (3mks)

……

……

……

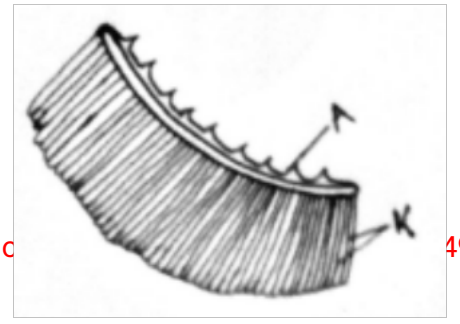
……

b) State two illustrations of Osmosis in plants (2mks)

……

……

25. The diagram below represents a gill of a fish



i) State two ways in which a large surface area is created in structures labelled K (2mks)

……

……

ii) Name the type of flow system that occurs between water and blood in the capillaries present on structures K (1mk)

……

iii) Name an organ in human beings that also display the flow system named in (ii) above (1mk)

……

26. Identical twins were separated after birth and were then raised in different environments. One in Kenya and the other in U.S.A. They rejoined after 18 years and they looked slightly different.

i) Name the type of variation the twins exhibited (1mk)

……

ii) Give two observable differences likely to be noted between the twins (2mks)

……

……

Paper 2

FORM FOUR

Kenya Certificate of Secondary Education

231/1 BIOLOGY

PAPER TWO

TIME: 2HRS

INSTRUCTIONS

1. Answer all questions in section A and question 6 in section B (It is compulsory)
2. Answer either question 7 or 8.

SECTION A (40MKS)

Answer all the questions in these section

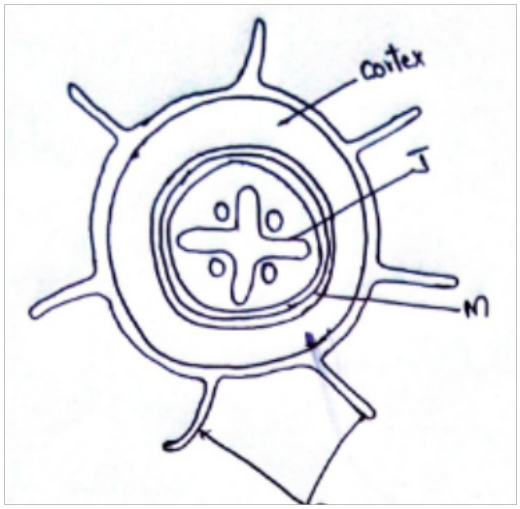
1. Haemophilia is a sex linked characteristic caused by a recessive gene located on one of the sex chromosomes.
   a) Name the chromosome onto which the gene for haemophilia is linked to (1mk)
   ……
   b) A normal man for the condition marries a normal woman for the condition but sadly one of their sons develop this condition from birth.
      i) What are the likely genotypes of this couple?
      (2mks)
      Man
      ……
      Woman
      ……
      ii) Using a punnet square, carry out a cross to show why the couple gave birth to haemophiliac son (4mks)
      Use (H),to represent the gene for normal condition and (h) to represent the gene for haemophilia

iii) Why is this haemophiliac condition very common in males than in female (1mk)

……

……

2. The figure below represents an organ obtained from a section of a plant. Use it to answer questions that follow.



D

a) i) Name the organ from which the above section was obtained. Give a reason for your answer (2mks)

……

……

……

ii) Structure labelled J is described as a mechanical tissue. Explain (1mk)

……

……

b) i) Name the process by which water passes across structure M (1mk)

……

ii)Explain two ways by which cells with structures Dare adapted to their functions (2mks)

……

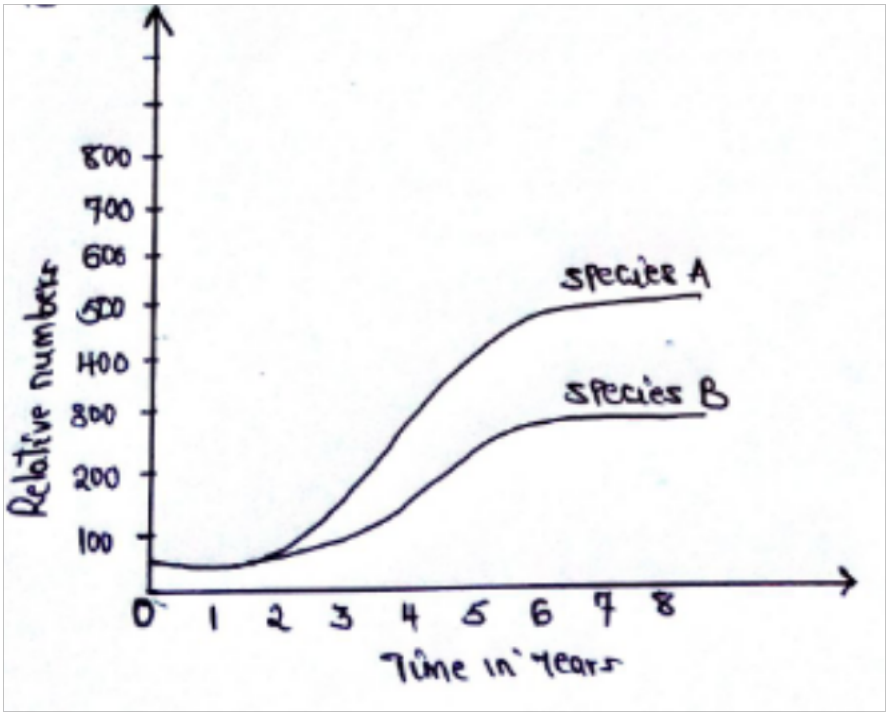
……

c) Name two strengthening materials that strengthen the collenchyma tissue (2mks)

……

……

3. The herbivorous mammalian species were introduced into an ecosystem at the same time and in equal numbers. The graph below represents their populations during the first seven years. Study the graph and answer the questions that follow.



a) i) Which species has a better competitive ability (1mk)

……

ii) Give reason for your answer (1mk)

……

……

b) Account for the shape of the curve of species A between

i) One year and three years (2mks)

……

……

……..

ii) Three years and seven years (2mks)

……

……

……

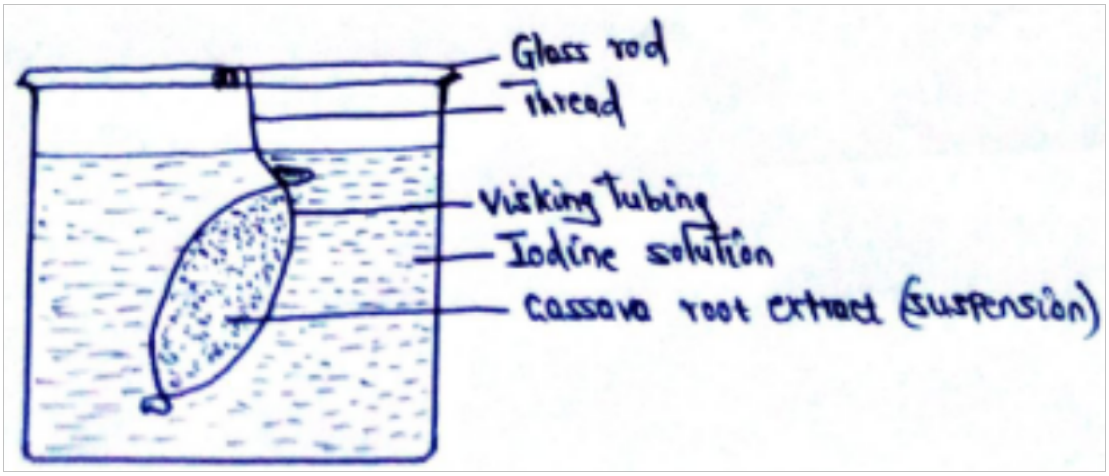
c) A natural predator for species A was introduced into the ecosystem. With a reason state how the population of each species would be affected (2mks)

……

……

……

4. A student from Abogeta secondary set up an experiment as illustrated below.



The visking tubing was left in iodine solution for 4 hours.

a) State the physiological process being investigated (1mk)

……

b) i) What were the expected results in the visking tubing and in the beaker (2mks)

……

……

……

ii)Account for your expected result in visking tubing (2mks)

……

……

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……

c) Mention three factors that influences the rate of active transport (3mks)

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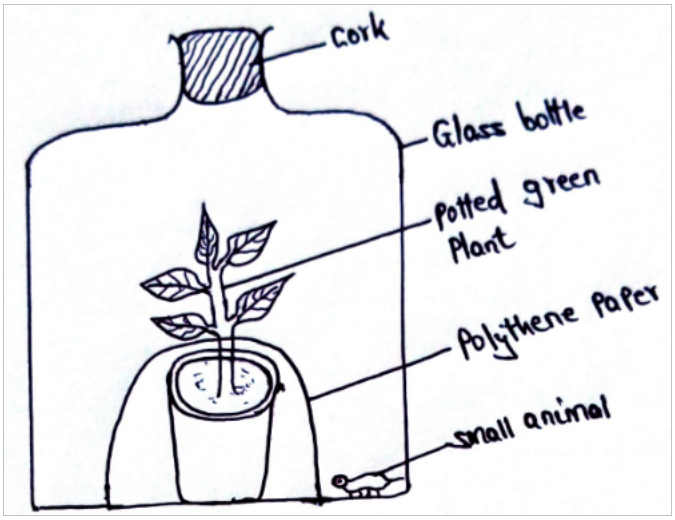
5. An experiment was set up to investigate a factor in autotrophism in green plants.



Vaseline was applied at joint between the cork and the mouth of glass bottle and set up was left under sunlight for 6 hours.

a) Why was it necessary;

i) To apply Vaseline (1mk)

……

ii) To cover the pot with polythene paper (1mk)

……

iii) What was the purpose of including the small animals? Give two reasons. (2mks)

……

……

b) i) What would happen to the small animal if the set up was left over night in darkness (1mk)

……

……

ii)Account for the answer in b (i) above (1mk)

……

……

c) State the respiratory surface of the following organism (2mks)

i) Amoeba

……

ii) Fish

……

SECTION B (40MKS)

Answer question 6 (Compulsory) and choose either question 7 or 8

6. A hungry person had a meal, after which the concentration of glucose and amino acids in the blood were determined. This was measured hourly as the blood passed through the hepatic portal vein and the iliac vein in the leg. The results were as shown in the table below.

Time (Hrs)	Concentration of contents in Hepatic portal vein (Mg/100ml)		Concentration of contents in the iliac vein of the leg (Mg/100ml)	
	Glucose	Amino acids	Glucose	Amino acids
0	85	1.0	85	1.0
1	85	1.0	85	1.0
2	140	1.0	125	1.0

3	130	1.5	110	1.5
4	110	1.5	90	3.0
5	90	3.0	90	2.0
6	90	2.0	90	1.0
7	90	1.0	90	1.0

a) Using the same axes draw graphs of concentration of glucose in the hepatic portal vein and the iliac vein in the leg against time
(7mks)

b) Account for the concentration of glucose in the hepatic portal vein from;

i) 0-1 hour (2mks)

……

……

……

……

ii) 1-2 hours (3mks)

……

……

……

……

……

iii) 2-4 hours (3mks)

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……

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……

iv) 5-7 hours (2mks)

……

……

……

……..

c) Account for the difference in the concentration of glucose in hepatic portal vein and the iliac vein between 2 and 4 hours
(2mks)

……

……

……

d) Using the data provided in the table explain why the concertation of amino acids in the hepatic portal vein took longer to increase (1mk)

……

……

……

Essays

7. a) Describe the opening and closing of the stomata using the photosynthetic theory (10mks)
   b) Describe blood sugar regulations in mammals (10mks)
8. a) Describe the adaptation of the following plants to their habitat;
   i) Xerophytes (15mks)
   ii) Hydrophytes (5mks)

Paper 3

Kenya Certificate of Secondary Education

231/3 BIOLOGY

PAPER THREE

TIME: 1¾ HRS

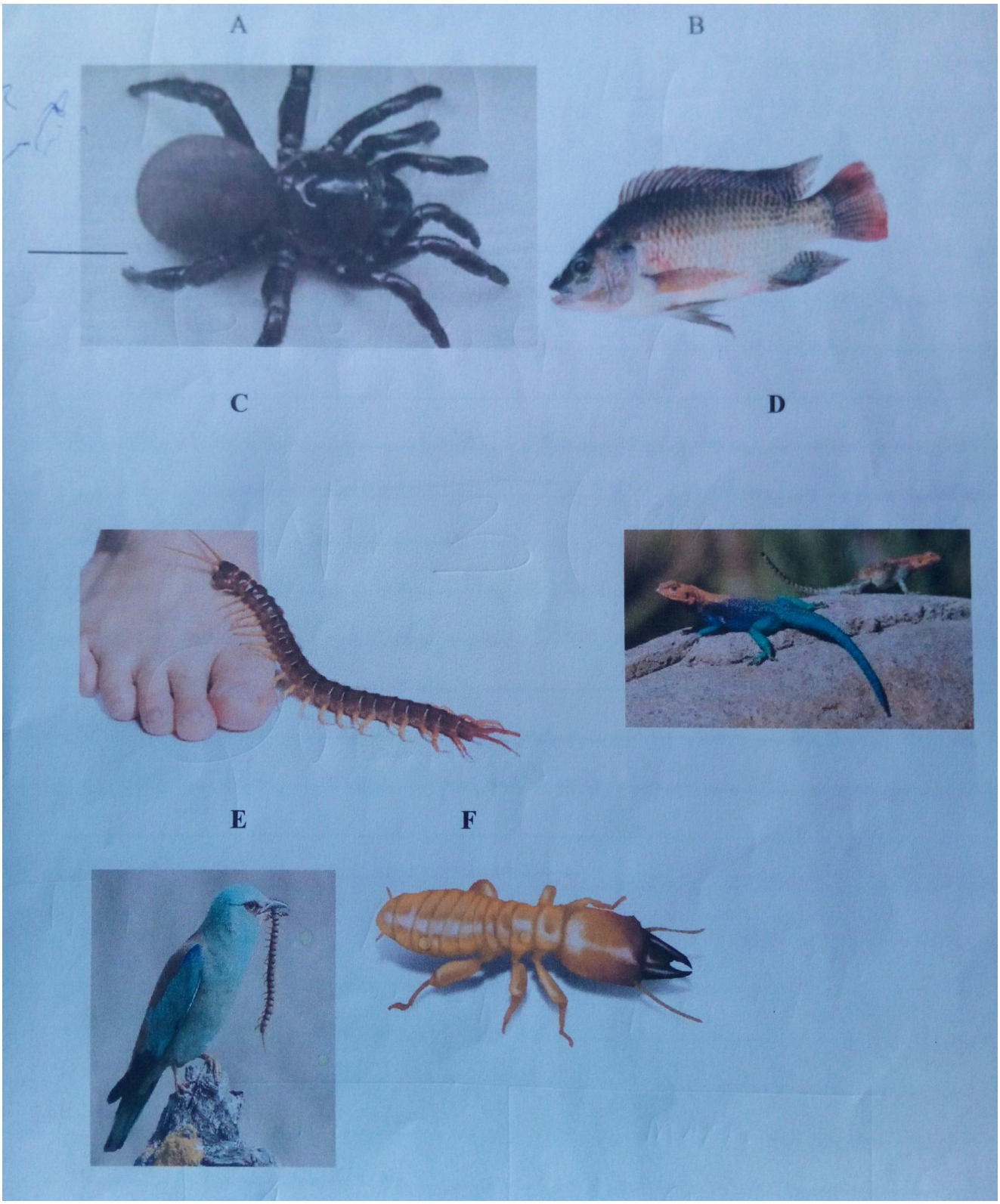
INSTRUCTIONS

1. Answer all questions in spaces provided

Examiner's Use

QUESTIONS	MAX.MARKS	CAND.SCORE
1	9	
2	13	
3	18	
TOTAL	40	

1. Study the organisms below



a) Complete and use the key below to identify the organisms (2mks)

1.a) Organism with endoskeleton ……...go to 2

1. b) _____.....go to 4

2. a) Has scales on the body ……..go to 4

2 b) Has no scales on the body ……mammalian

3a) Has cephalothorax ……...Arachnida

3b) Has no cephalothorax ……go to 5

4a) _____.....Pisces

4b) Has no fins ……go to 7

5a) Has three pairs of legs ……..Insect

5b) Has more than three pairs of legs ……go to 6

6a) Two pairs of legs per segment ……Diplopoda

6b) One pair of legs per segment ……Chilopoda

7a) Has feathers …… Aves

7b) Has no feathers ……go to 8

8a) Has a tail ……Reptilia

8b) Has no tail ……Amphibia

b) Identify the organisms above using the completed key above (6mks)

Specimen	Steps followed	Identity
A	_____	_____
B	_____	_____
C	_____	

_____

D _____

_____

E _____

_____

F _____

_____

c) Name the phylum in which specimens C, E and F belong to.
(1mk)

……

d) Give three reasons for your answer in (c) above (3mks)

……

……

……

e) Name one feature that is common in organisms B, E and D
(1mk)

……

2. You are provided with the following;
   i) Hydrogen peroxide
   ii) Specimen K
   iii) Pestle and mortar
   iv) 4 test tubes
   v) A scalpel
   vi) Source of heat
   vii) Test tube holder

   Using a scalpel, obtain three peeled cubed from specimen K measuring about 1cm x 1cm x 1cm. For the first cube, you are required to boil it in water for five minutes. For the second cube, you are required to crush it into a paste. For the last cube, you are required to use it as it is.

   Label three test tubes A, B and C and put 2ml of hydrogen peroxide in each test tube. To test tube A, add the boiled cube and record your observation.
   To test tube B. add the crushed paste and record your observation.

To test tube C, add the unboiled cube remaining and record your observation.

a) Complete the table below (3mks)

Test tube	Observation
A	
B	
C	

b) Explain your observation in test tube A (1mk)

……

……

……

c) Between test tubes B and C, in which test tube was the volume of foam produced the highest? Explain (3mks)

……

……

……

……

d) Apart from temperature, state two other factors that affect the rate of enzyme controlled reactions

(2mks)

……

……

……

3. The photographs below shows specimen of different types of fruits. Examine them and answer the questions that follow.

a) State four differences between specimen P and R
(4mks)

……

……

……

……

……

……

b) State the types of gynoecium and placentation of specimen P, S and V
(4mks)

i) Specimen P Gynoecium ……..
Placentation ……

ii) Specimen S Gynoecium ……

Placentation……

iii) Specimen V Gynoecium ……..

Placentation ……..

c) In the table below name the mode of dispersal for each specimen and the features that adapt the specimen to its mode of dispersal.

(6mks)

Specimen	Mode of dispersal	Adaptive features
P		
Q		
R		
S		
T		
v		

d) Draw and label a plan diagram of specimen V (4mks)