

Name ..... Index Number .....

231/1  
BIOLOGY  
Paper 1  
Nov. 2016  
2 hours

Candidate's Signature .....

Date .....



**THE KENYA NATIONAL EXAMINATIONS COUNCIL**  
**Kenya Certificate of Secondary Education**  
**BIOLOGY**  
**Paper 1**  
2 hours

**Instructions to candidates**

- (a) Write your name and index number in the spaces provided above.
- (b) Sign and write the date of the examination in the spaces provided above.
- (c) Answer all the questions in this question paper.
- (d) All answers must be written in the spaces provided.
- (e) This paper consists of 11 printed pages.
- (f) Candidates should check the question paper to ascertain that all the pages are printed as indicated and that no questions are missing.
- (g) Candidates should answer the questions in English.

**For Examiner's Use Only**

Question	Maximum Score	Candidate's Score
1-20	80	



*Answer all the questions in the spaces provided.*

1. (a) State **two** ways in which the muscles of the mammalian heart are special. (2 marks)

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.....  
.....

- (b) Name the type of muscles found in the following organs. (2 marks)

Stomach .....

Bone .....

2. Why are plants able to accumulate most of their waste products for long? (2 marks)

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3. State the importance of tactic responses among members of Kingdom Protista. (2 marks)

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4. (a) Name **one** defect of the circulatory system in humans. (1 mark)

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- (b) State **three** functions of blood other than transport. (3 marks)

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5. State the economic importance of anaerobic respiration in plants. (1 mark)

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6. Explain continental drift as evidence of evolution. (3 marks)

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7. Explain how the following prevent self pollination. (1 mark)

(i) Protandry

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(ii) Self-sterility (1 mark)

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8. State three functions of Golgi apparatus. (3 marks)

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9. (a) Name **two** structures of gaseous exchange in aquatic plants. (2 marks)

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(b) What is the effect of contraction of the diaphragm muscles during breathing in mammals. (3 marks)

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10. (a) State **two** disadvantages of sexual reproduction in animals. (2 marks)

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(b) State **two** functions of a placenta. (2 marks)

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11. Name **two** benefits that a parasite derives from its host. (2 marks)

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12. Other than using a quadrat give **two** methods that can be used to estimate the population of grass. (2 marks)

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13. (a) State **two** factors that affect enzymatic activities. (2 marks)

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(b) Explain how **one** of the factors stated in (a) above affects enzymatic activities. (1 mark)

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14. Give **three** factors that determine the amount of energy a human being requires in a day. (3 marks)

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15. (a) What is seed dormancy? (1 mark)

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(b) Name a growth inhibitor in seeds. (1 mark)

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16. State **one** use of each of the following excretory products of plants. (2 marks)

(i) Colchicine

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.....

(ii) Papain

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.....

17. State the name given to the study of:-

(i) The cell (1 mark)

.....

(ii) Micro-organisms (1 mark)

.....

18. Distinguish between haemolysis and plasmolysis. (2 marks)

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19. Explain why it is not advisable to be in a poorly ventilated room with a burning charcoal stove. (3 marks)

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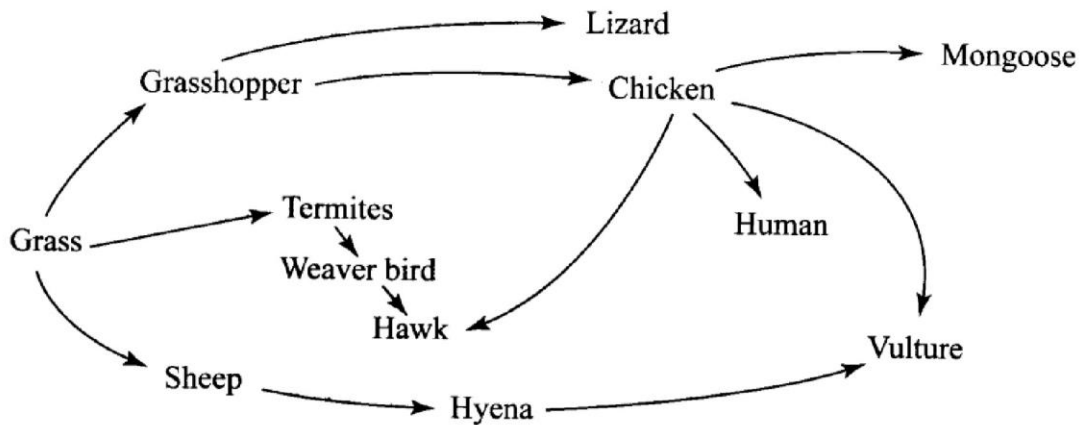
20. State **three** factors that contribute to the deceleration phase in the population curve of an organism. (3 marks)

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21. The figure below illustrates a food web in a certain ecosystem.



From the food web:

- (a) Draw the shortest food chain (1 mark)
- (b) Identify the organism with the highest:
- (i) number of predators (1 mark)
- .....
- (ii) biomass (1 mark)
- .....

22. State **three** characteristics of the class Crustacea. (3 marks)

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23. (a) Name **one** salivary gland in humans. (1 mark)

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(b) State **two** functions of saliva. (2 marks)

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24. How does nutrition as a characteristic of living organisms differ in plants and animals. (2 marks)

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25. Distinguish between diffusion and osmosis. (2 marks)

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26. State the functions of the following parts of a microscope. (2 marks)

(a) Objective Lens

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(b) Diaphragm

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27. (a) What is single circulatory system? (1 mark)

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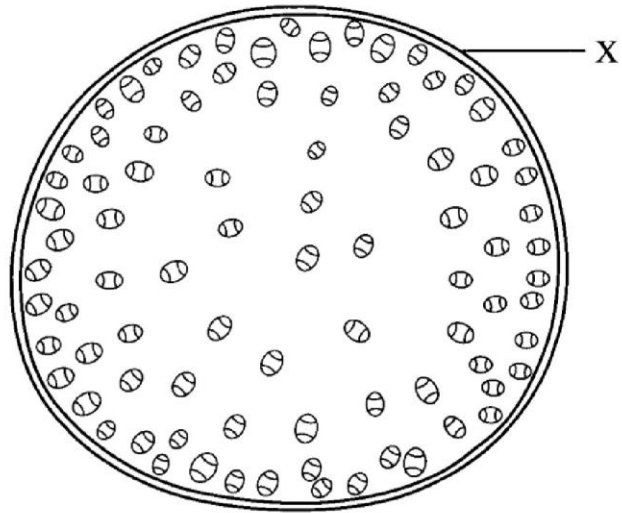
(b) Name an organism which has a single circulatory system. (1 mark)

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(c) Name the opening to the chamber of the heart of an insect. (1 mark)

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28. The diagram below shows a transverse section of a plant organ.



(a) Name the plant organ from which the section was obtained. (1 mark)

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(b) (i) Name the class to which the organism from which section was obtained belongs. (1 mark)

.....

(ii) Give a reason for your answer in b (i) above. (1 mark)

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29. (a) State a characteristic that is common to all cervical vertebrae. (1 mark)

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(b) Name **two** tissues in plants that provide mechanical support. (2 marks)

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30. State **two** advantages of hybrid vigour. (2 marks)

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**THIS IS THE LAST PRINTED PAGE.**

Name ..... Index Number .....

231/2  
BIOLOGY  
Paper 2 (THEORY)  
Nov. 2016  
2 hours

Candidate's Signature .....

Date .....



**THE KENYA NATIONAL EXAMINATIONS COUNCIL**  
Kenya Certificate of Secondary Education  
BIOLOGY  
Paper 2 (THEORY)  
2 hours

**Instructions to candidates**

- (a) Write your name and index number in the spaces provided above.
- (b) Sign and write the date of the examination in the spaces provided above.
- (c) This paper consists of **two** sections; **A** and **B**.
- (d) Answer **all** the questions in section **A** in the spaces provided.
- (e) In section **B** answer question 6 (**compulsory**) and either question 7 or 8 in the spaces provided after question 8.
- (f) This paper consists of 12 printed pages.
- (g) Candidates should check the question paper to ascertain that all the pages are printed as indicated and that no questions are missing.
- (h) Candidates should answer the questions in English.

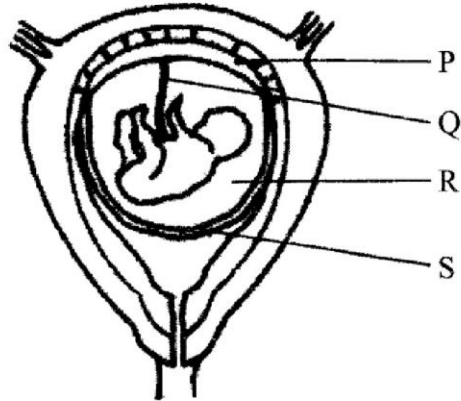
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Section	Question	Maximum Score	Candidate's Score
<b>A</b>	1	8	
	2	8	
	3	8	
	4	8	
	5	8	
<b>B</b>	6	20	
	7	20	
	8	20	
<b>Total Score</b>		<b>80</b>	

**SECTION A (40 marks)**

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

1. The diagram below represents a human foetus in a uterus.



- (a) Name the part labeled S. (1 mark)

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 .....

- (b) (i) Name the types of blood vessels found in the structure labeled Q. (2 marks)

.....  
 .....

- (ii) State the difference in composition of blood found in the vessels named in (b) (i) above. (2 marks)

.....  
 .....

- (c) Name **two** features that enable the structure labeled P to carry out its function. (2 marks)

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(d) State the role of the part labeled R. (1 mark)

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2. (a) How is sex determined in man? (4 marks)

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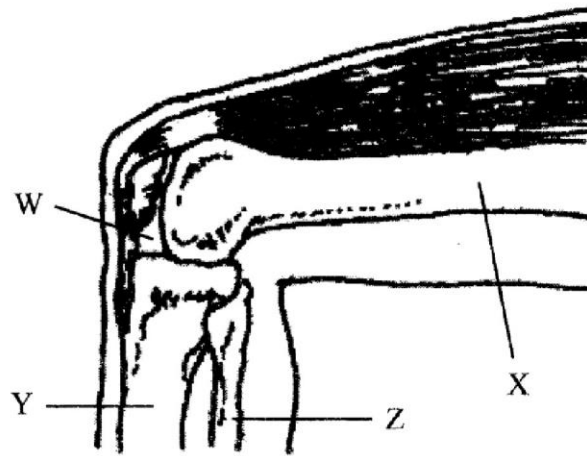
(b) (i) Differentiate between sickle cell anaemia and sickle cell trait. (2 marks)

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(ii) Explain why people with sickle cell trait have an adaption survival advantage over normal individuals in malaria endemic regions. (2 marks)

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3. The diagram below represents bones at a joint found in the hind limb of a mammal.



(a) Name the bones labeled X, Y and Z (3 marks)

X: .....

Y: .....

Z: .....

(b) (i) Name the substance found in the place labeled W. (1 mark)

.....  
 .....  
 .....

(ii) State the function of the substance named in (b) (i) above. (1 mark)

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 .....

(c) Name the structure that joins bones together at the joint. (1 mark)

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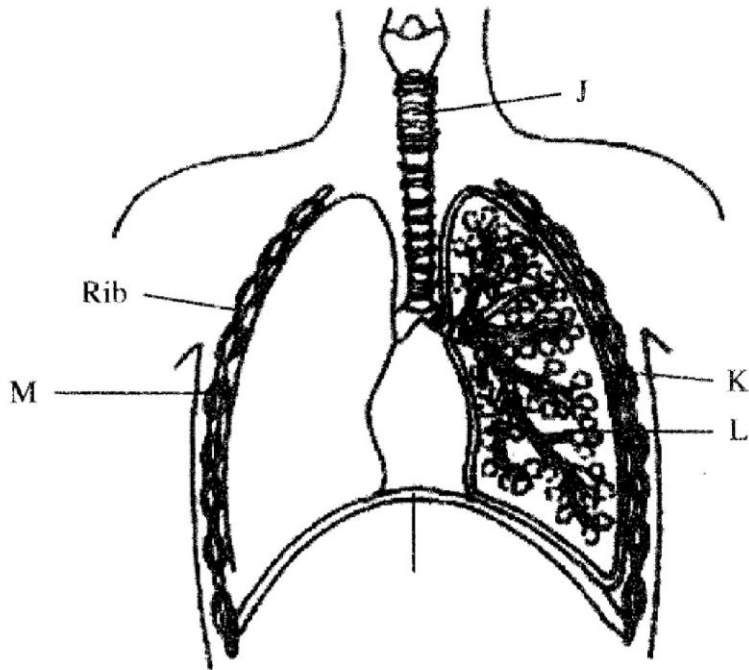
- (d) State the difference between ball and socket joint and the one illustrated in the diagram above. (1 mark)

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- (e) Name the structure at the elbow that performs the same function as the patella. (1 mark)

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4. The diagram below represents some gaseous exchange structures in humans.



- (a) Name the structures labeled K, L and M. (3 marks)

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(b) How is the structure labeled J suited to its function? (3 marks)

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(c) Name the process by which inhaled air moves from the structure labeled L into blood capillaries. (1 mark)

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.....

(d) Give the scientific name of the organism that causes tuberculosis in humans. (1 mark)

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5. A freshly obtained dandelion stem measuring 5cm long was split lengthwise to obtain two similar pieces.

The pieces were placed in two different solutions of different concentrations in petri dishes ( $L_1$  and  $L_2$ ) for 20 minutes. The appearance after 20 minutes is as shown.



- (a) Account for the appearance of the pieces in solutions  $L_1$  and  $L_2$ . (6 marks)

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- (b) State the significance of the biological process involved in the experiment. (2 marks)

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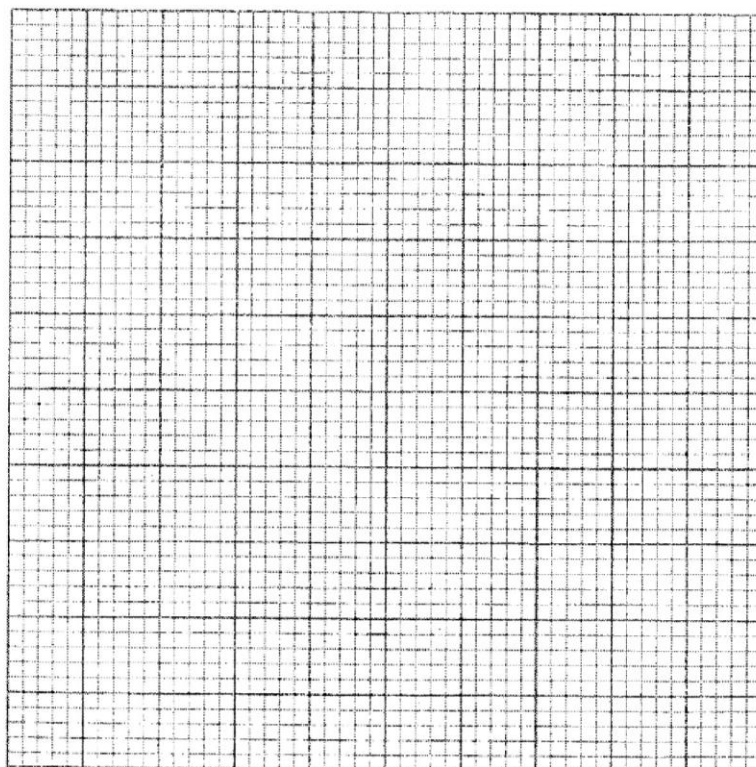
**SECTION B (40 marks)**

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

6. An experiment was carried out to investigate the effect of temperature on the rate of reaction catalysed by an enzyme. The results are shown in the table below.

Temperature (°C)	Rate of reaction in mg of products per unit time
5	0.2
10	0.5
15	0.8
20	1.1
25	1.5
30	2.1
35	3.0
40	3.7
45	3.4
50	2.8
55	2.1
60	1.1

- (a) On the grid provided plot the rate of reaction against temperature. (6 marks)



(b) When was the rate of reaction 2.6 mg of product per unit time? (2 marks)

.....  
.....

(c) Account for the shape of the graph between:

(i) 5°C and 40°C (2 marks)

.....  
.....  
.....  
.....

(ii) 45°C and 60°C (3 marks)



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(d) Other than temperature name **two** ways in which the rate of reaction between 5°C and 40°C could be increased. (2 marks)

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(e) (i) Name **one** digestive enzyme in the human body which works best in acidic condition. (1 mark)

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.....

(ii) How is the acidic condition for the enzyme named in (e) (i) above attained? (2 marks)

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.....



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Name ..... Index Number .....

231/3  
BIOLOGY  
Paper 3  
(PRACTICAL)  
Nov. 2016  
1¾ hours

Candidate's Signature .....

Date .....



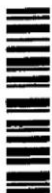
**THE KENYA NATIONAL EXAMINATIONS COUNCIL**  
Kenya Certificate of Secondary Education  
BIOLOGY  
Paper 3  
(PRACTICAL)  
1¾ hours

**Instructions to candidates**

- (a) Write your name and index number in the spaces provided above.
- (b) Sign and write the date of examination in the spaces provided above.
- (c) Answer **all** the questions in the spaces provided.
- (d) You are required to spend the first 15 minutes of the 1¾ hours allowed for this paper reading the whole paper carefully before commencing your work.
- (e) Additional pages must **not** be inserted.
- (f) **This paper consists of 6 printed pages.**
- (g) **Candidates should check the question paper to ascertain that all the pages are printed as indicated and that no questions are missing.**
- (h) **Candidates should answer all the questions in English.**

**For Examiner's Use Only**

Question	Maximum Score	Candidate's Score
1	14	
2	13	
3	13	
<b>Total Score</b>	40	



1. You are provided with specimen G.

- (a) (i) Cut off the petiole, about 1.5 cm from the end where the leaf attaches to the stem.
- (ii) Carefully make several thin cross sections through the piece obtained in (a)(i) above, using a sharp razor blade or scalpel.
- (iii) Put the sections obtained in water on a Petri dish.
- (iv) Mount the thinnest section(s) on a glass slide, add a drop of iodine solution provided.
- (v) Observe the section(s) using a hand lens, then draw a labelled diagram of the section observed. (3 marks)

(b) Account for the following features of specimen G.

- (i) Extensive network of veins (1 mark)  
.....
- (ii) Tough leaf blade (1 mark)  
.....
- (iii) Strong and extended petiole (1 mark)  
.....

(c) State with reasons, the class of plants from which the specimen was obtained.

Class ..... (1 mark)

Reasons: .....  
.....  
..... (3 marks)

(d) Explain why the following procedures were necessary during the preparation of the sections for observation.

(i) Putting the sections in water on a Petri dish. (1 mark)

.....

(ii) Using a sharp scapel/razor blade. (1 mark)

.....

(iii) Adding iodine solution to the section. (1 mark)

.....

(iv) Cutting very thin sections. (1 mark)

.....



2. Study the photograph below of some animals in a certain ecosystem and answer the questions that follow.



(a) State the type of biotic relationship exhibited by the animals shown in the photograph. (1 mark)

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(b) (i) Identify which of the two animals, E and F, will have the least biomass? (1 mark)

.....

(ii) Give a reason for your answer in (b)(i) above. (2 marks)

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.....

(c) Explain the concept of "Survival for the fittest" in relation to the organisms illustrated in the photograph. (3 marks)

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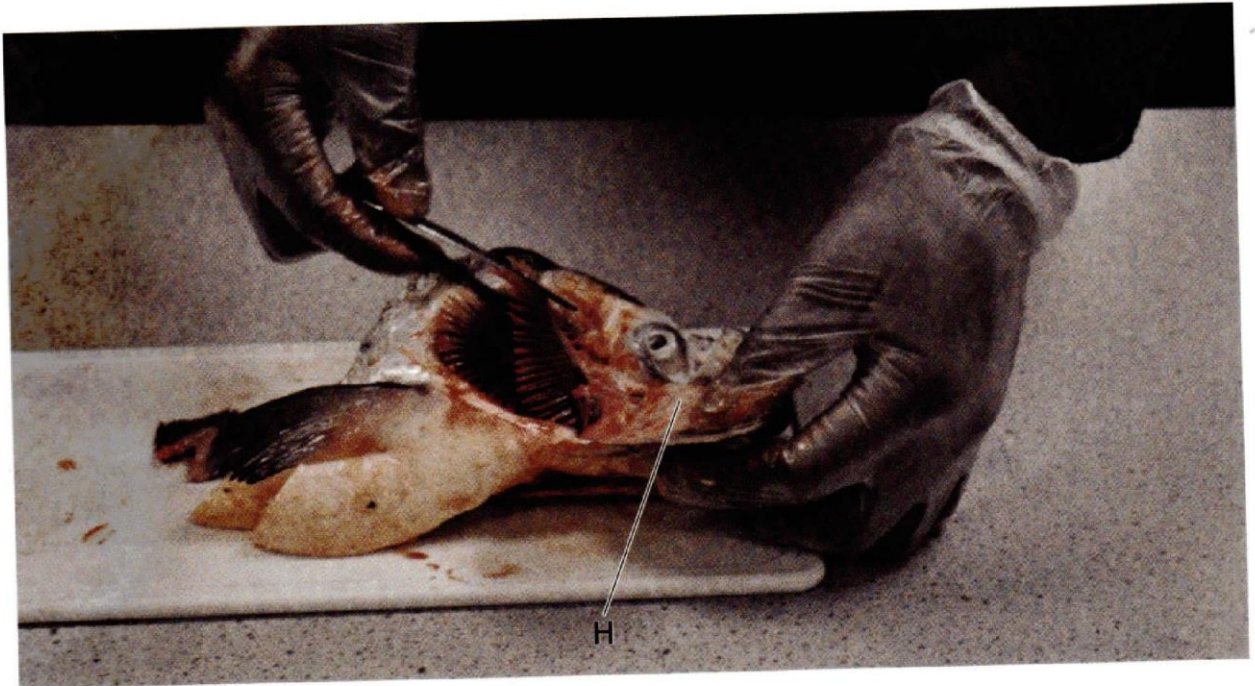
(d) Explain **three** visible survival adaptive features for the organisms illustrated in the photograph. (6 marks)

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3. The photograph below illustrates a procedure carried out to study gaseous exchange structures in a certain organism.



- (a) Identify **two** dissecting tools being used in the procedure illustrated. (2 marks)
- .....
- .....
- (b) (i) Name the class of the animal in use. (1 mark)
- .....
- (ii) State any **two** visible characteristics from the photograph to support your answer in (b)(i) above. (2 marks)
- .....
- .....
- (c) Name the part of the organism labelled H and state its function.
- Name: ..... (1 mark)
- Function:..... (1 mark)

(d) (i) Draw the gaseous exchange structure under study and on it, label the site for gaseous exchange. (3 marks)

(ii) How is the part labelled in (d)(i) adapted to efficient gaseous exchange? (3 marks)

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