

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.**

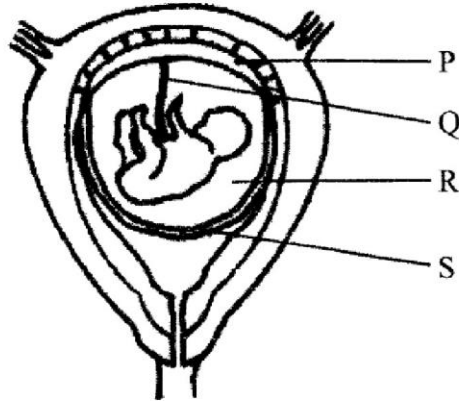
**For Examiner's Use Only**

Section	Question	Maximum Score	Candidate's Score
A	1	8	
	2	8	
	3	8	
	4	8	
	5	8	
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)

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

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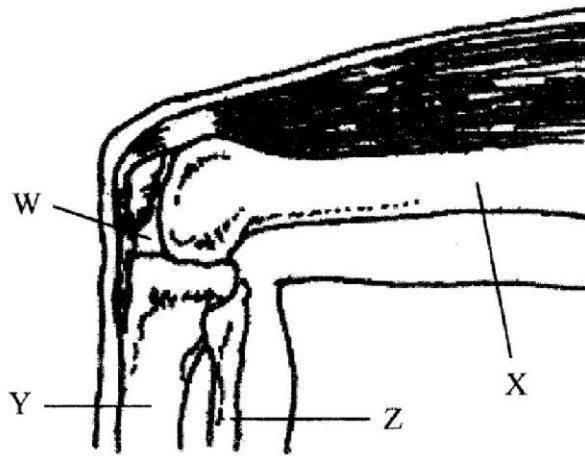
(b) (i) Differentiate between sickle cell anaemia and sickle cell trait. (2 marks)

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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)

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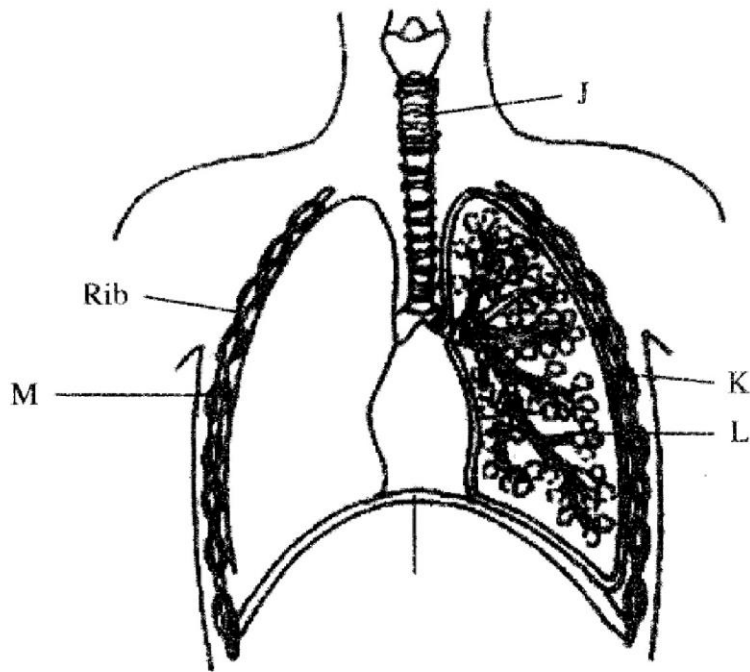
- (d) State the difference between ball and socket joint and the one illustrated in the diagram above. (1 mark)

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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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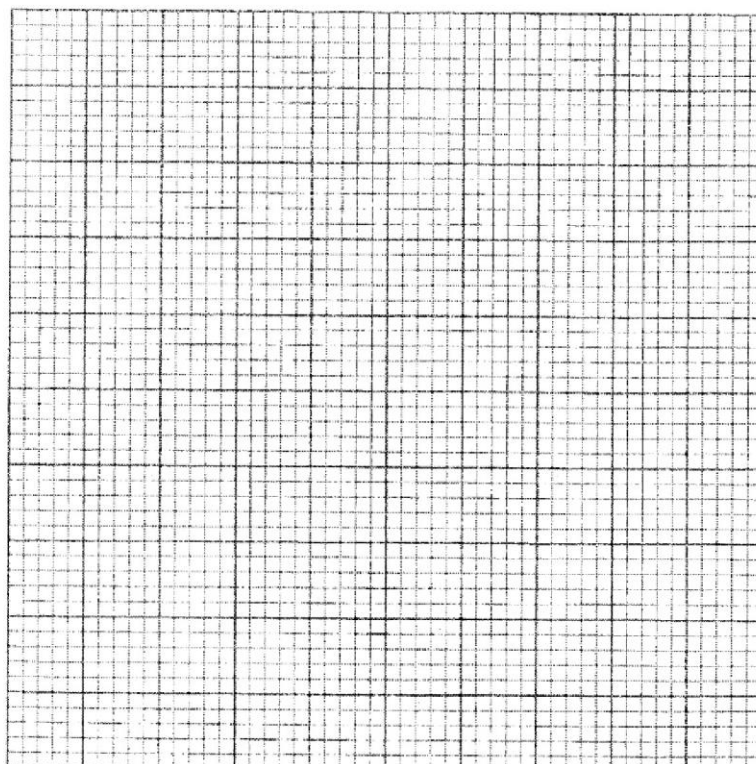
**SECTION B (40 marks)**

*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)

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

(i) 5°C and 40°C (2 marks)

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(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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(f) The acidic condition in (e) (iii) above is later neutralized.

(i) Where does the neutralization take place? (1 mark)

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(ii) Name the substance responsible for the neutralization. (1 mark)

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

8. Describe how the mammalian heart is structurally adapted to its function. (20 marks)

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