**NAME……………………………………………………………ADM NO…….……**

**SCHOOL ………………………………….………………. DATE ……………**

**FORM FOUR**

**BIOLOGY**

**PAPER 2 (THEORY)**

**JUNE/JULY 2022**

**TIME…..2 HOURS**

**INSTRUCTIONS TO CANDIDATES**

* Write your name and Admission Number in the spaces provided above.
* This paper consists of **two** sections**:** Section **A** and section **B.**
* Answer **ALL** questions in section **A** in the spaces provided.
* In section **B** answer question **6** (compulsory) and either question **7** or **8** in the spaces provided after question 8

**For Examiners use only.**

|  |  |  |  |
| --- | --- | --- | --- |
| **Section** | **Question** | **Maximum score** | **Candidates score** |
| **A** | **1** | **8** |  |
| **2** | **8** |  |
| **3** | **8** |  |
| **4** | **8** |  |
| **5** | **8** |  |
| **B** | **6** | **20** |  |
| **7** | **20** |  |
| **8** | **20** |  |
|  | **Total score** | **80** |  |

***SECTION A (40MARKS)***

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

1 (a) What is meant by linked genes? (1mk)

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(b) Njoki is an albino.Her husband Mwenda has normal skin colour.Two of their children have normal skin colour while the other two are albinos.If albinism is a sex linked trait;

(a)Give the genotype of

(i)Njoki (1mk)

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(ii)Mwenda (1mk)

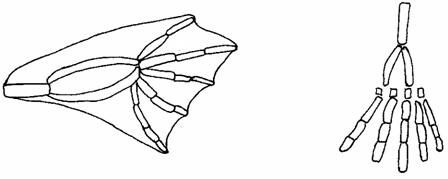
…………………………………………………………………………………………………

(b)Illustrate the cross between the two parents (4mks)

(c)Give genotypic ratio of the offsprings (1mk)

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2 **(a)** The diagram below shows structures of the bat wing and human arm.



Wing membrane

(a)These structures are thought to have same ancestral origin. State one structural similarity

and one adaptational difference between the two.

1. Structural similarity. (1 mark)

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1. Adaptation difference. (2 marks)

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(b) Give **two** other examples of structures in nature that show the type of evolution as in

(a) above. (2 marks)

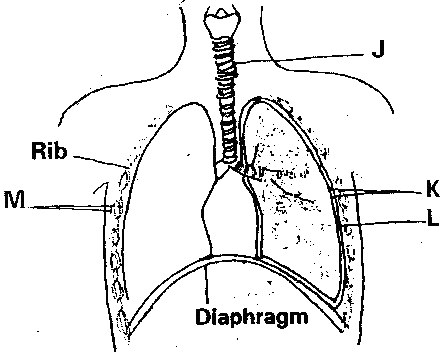
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(c) Distinguish between the terms ‘chemical evolution’ and ‘organic evolution’. (2 marks)

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(d) What is the study of fossils called? (1 mark)

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

a) Name the structure labeled K, L and M (3mks)

K…………………………………………….

L………………….…………………………

M………………………………………………

b) How is the structure labeled J suited to its functions? (3mks)

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c) Name the process by which inhaled air moves from the structure

labeled L into blood capillaries. (1mk)

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d) Give the scientific name of the organism that causes tuberculosis in

humans. (1mk)

4. (a) (i)The action of ptyalin stops at the stomach. Explain. (1mk)

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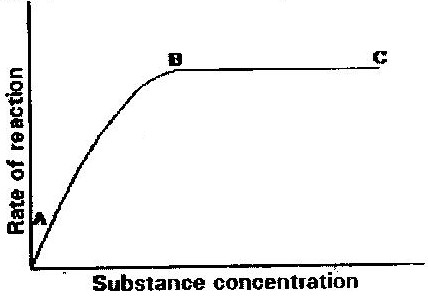
(ii)State a factor that denatures enzymes. (1mk)

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(iii)Name the features that increase the surface area of small intestines. (1mk)

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(b)The graph below shows the effect of substrate concentration on the rate of enzyme reaction.



(i) Account for the shape of the graph between A and B (2mks)

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(ii) How can the rate of reaction be increased after point B? (1mk)

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(iii) State two factors that affect the rate of enzyme reaction. (2mks)

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5  **(a)** Laboratory analysis of a patient’s urine revealed the following concentration of various

substances:

Blood proteins 0.00%

Water 50%

Glucose 48%

Salts 0.8%

Urea 1.2%

(i) From the analysis above, which disease is the patient suffering from (1mk)

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(ii) Explain the cause of the disease in **3(a)** above(2mks)

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(iii) Which organ in the person may not be functioning properly? (1mk)

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**(b)** Explain the effects of the following on the quantity and composition of urine

(i) Drinking large amount of clean water (2mks)

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(ii) Drinking very salty soup (2mks)

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***SECTION B (40 Marks)***

***Answer questions 6 (compulsory) and either questions 7 or 8***

***6***. The following data are results of making daily growth measurement ion an organism

over a period of 24 days during its development.

|  |  |  |
| --- | --- | --- |
| **Day** | **Width of head (mm)** | **Length of hind femur (mm)** |
|  | 3.0  3.5  4.0  4.0  4.0  4.0  4.0  4.4  4.7  5.0  5.0  5.0  5.0  5.0  5.0  5.0  5.7  6.4  7.0  7.6  7.6  7.6  7.6  7.6 | 7.0  7.5  8.0  8.0  8.0  9.2  10.5  12.0  12.0  12.0  12.0  12.0  12.0  12.0  13.3  14.8  16.4  18.0  18.0  18.0  18.0  18.0  18.0  18.0 |

(a) Using a suitable scale draw graphs of width of head and length of femur against time. Draw the graphs on the same axis. ( 8 marks)



(b) (i) Name the growth pattern represented by the graph ( 1 mark)

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(ii) With reference to your graph identify the phylum to which the organisms belong. Give a reason for your answer ( 2 marks)

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(c) Account for the length of hind femur between

(i) Day 3 and day 7 ( 3 marks)

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(ii) Day 7 and day 10 ( 2 marks)

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(d)State two hormones involved in the growth pattern represented by the graphs ( 2 marks)

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(e) State two advantages of metamorphosis in organisms ( 2 marks)

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7 (a) Describe how the mammalian small intestine is adapted to its function. (12mks)

(b) For each of the following nutrients give one example of its role in the body and the deficiency disease it may cause ? (8mks)

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| --- | --- | --- |
| Nutrient | Role in the body | Deficiency disorder it causes |
| Vitamin A |  |  |
| Iron |  |  |
| Iodine |  |  |
| Vitamin D |  |  |

8. a) Describe the process of fertilization in flowering plant. (15mks)

b) State the changes that take place in a flower after fertilization. (5mks) 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