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Name .....

School .....

Roll Number.....

**Republic of Somaliland**

**Somaliland National Examination Board**

**Form 4 Biology Examination**

**June 2006**

**TIME 2 hours**

Plus 10 minutes before the exam for reading through the paper

**TOTAL TIME 2 hours 10 minutes**

## **INSTRUCTIONS TO CANDIDATES**

This paper consists of 15 printed pages.

Count them now. Inform the invigilator if there are any pages missing.

PART ONE: Multiple Choice	10 marks
PART TWO: Structured questions	90 marks
<b>TOTAL</b>	<b>100 marks</b>

- Answer ALL the questions.
- All answers must be written on this paper in the spaces provided immediately after each question.
- All working should be clearly shown in the space after the question.
- Rough work can be done on page 2. This will not be marked
- No extra paper is allowed.
- No calculators are allowed.
- If you make a mistake cross out the incorrect answer clearly and write your correct answer.

**USE THIS PAPER FOR ROUGH WORK, IT WILL NOT BE MARKED.**



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**PART ONE Multiple Choice Questions**

**(10 marks)**

**Instructions:** For each question in this section, **circle** the correct answer.

For each question there is only **one** correct answer. Each question is worth one mark.

1. Plant *growth* responding to the stimulus of **gravity** is called

- |   |              |   |              |
|---|--------------|---|--------------|
| A | phototropism | B | geotropism   |
| C | hydrotropism | D | chemotropism |

2. All of the following diseases are caused by *bacteria*, except

- |   |          |   |                   |
|---|----------|---|-------------------|
| A | AIDS     | B | tuberculosis (TB) |
| C | syphilis | D | gonorrhoea        |

3. A gene can be defined as:

- A a small circular piece of DNA found in bacteria.
- B an enzyme that joins DNA sections.
- C the bonding of DNA fragments from a donor cell to the plastids.
- D a section of DNA coding for a specific protein.

4. Which of the following are **NOT** *true* cells

- |   |                  |   |                   |
|---|------------------|---|-------------------|
| A | eukaryotic cells | B | bacteria          |
| C | viruses          | D | prokaryotic cells |

5. The *continuous flow* of water through plants is known as

- |   |           |   |                      |
|---|-----------|---|----------------------|
| A | osmosis   | B | transpiration stream |
| C | turgidity | D | translocation        |

6. This question is about different types of *nutrition*. The *process* of making (synthesising) organic molecules from inorganic molecules is known as

- |   |                         |   |                        |
|---|-------------------------|---|------------------------|
| A | heterotrophic nutrition | B | saprobiontic nutrition |
| C | autotrophic nutrition   | D | holozoic nutrition     |

7. Where are pollen grains produced

- |   |        |   |        |
|---|--------|---|--------|
| A | stigma | B | carpel |
| C | ovary  | D | anther |

8. A *hormone* is best defined as a chemical that

- A is produced at one site or gland but has an effect at another site or target.
- B is found in very small quantities in foodstuffs to keep humans healthy.
- C causes the breakdown of amino acids into proteins.
- D emulsifies fats to give enzymes a larger area for enzyme action.

9. If a diploid tomato cell with 24 chromosomes undergoes meiosis, how many chromosomes will each of the gametes have produced?

- |   |    |   |    |
|---|----|---|----|
| A | 6  | B | 12 |
| C | 24 | D | 48 |

10. All the individuals of *one species* in an *ecosystem* at a given moment is known as a

- |   |            |   |           |
|---|------------|---|-----------|
| A | niche      | B | community |
| C | population | D | habitat   |



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### PART TWO Structured Questions

**Instruction:** Answer all the questions below as fully as possible. You must write all the answers in the spaces provided on the paper. The marks awarded for each section are shown.

#### Question 2

**Enzymes** control *metabolic reactions* in the body and the rate (speed) at which they occur.

(a) What name is given to metabolic reactions that *synthesise* (make) new molecules?  
..... (1)

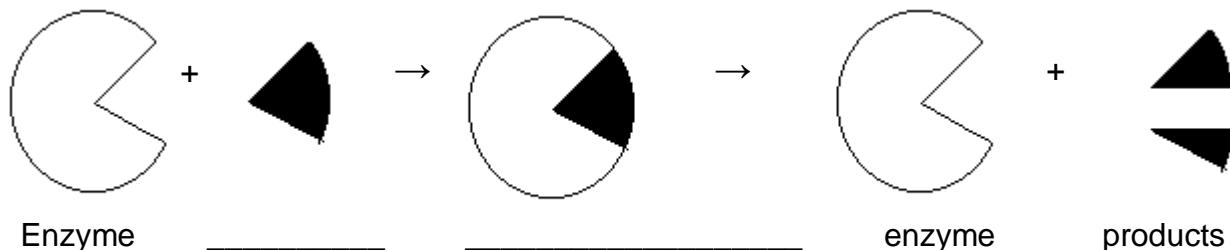
(b) What name is given to metabolic reactions that *break down* molecules?  
..... (1)

(c) Does building new molecules or breaking molecules *take* or *give* energy overall?  
..... (1)

(d) Enzymes are termed *biological catalysts*. What does the term *catalyst* mean?  
.....  
..... (2)

(e) What is meant by the term *activation energy* ?  
..... (1)

(f) The following diagram shows how an enzyme reacts. Complete it to give the missing names of the shapes (2)



(g) Explain what is meant by the *lock and key* theory to describe how an enzyme works

.....

.....

.....(2)

(h) Explain what is meant by the *induced fit* theory to describe how an enzyme works

.....

.....

.....(2)

(i) Name the enzymes which catalyse the following reactions:-

[i] Amylase .....(1)

[ii] Lipase .....(1)

(i) Where in the human body are these two found?

[i] Amylase .....

[ii] Lipase .....(2)

Total 16 marks

**Question 3**

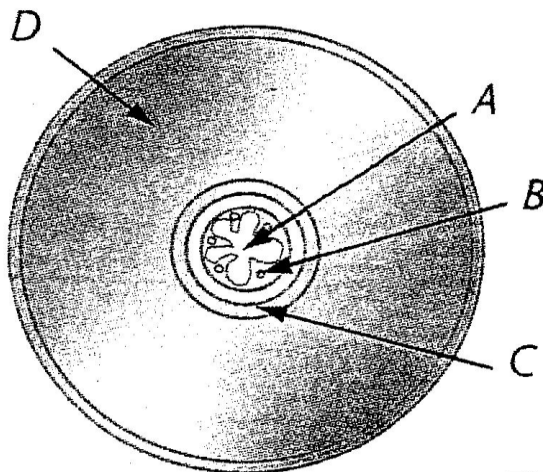
Use the table to name the *organelle* responsible for the *function* given in each case.

Organelle(s)	Function
(a)	Sites of many biochemical reactions of aerobic respiration including Krebs Cycle.
(b)	Controls entry and exit of material from cells in various ways, such as diffusion, osmosis, active transport, etc.
(c)	Provides rigidity and support.
(d)	Contain splitting enzymes that digest worn out tissue and foreign material in the cell.
(e)	Increase the surface area of the cell and so increases the rate of absorption.
(f)	Synthesise proteins from amino acids brought by transfer RNA.

Total 6 marks

**Question 4**

The following drawing shows a transverse section through a root:-



Label the parts

A \_\_\_\_\_

B \_\_\_\_\_

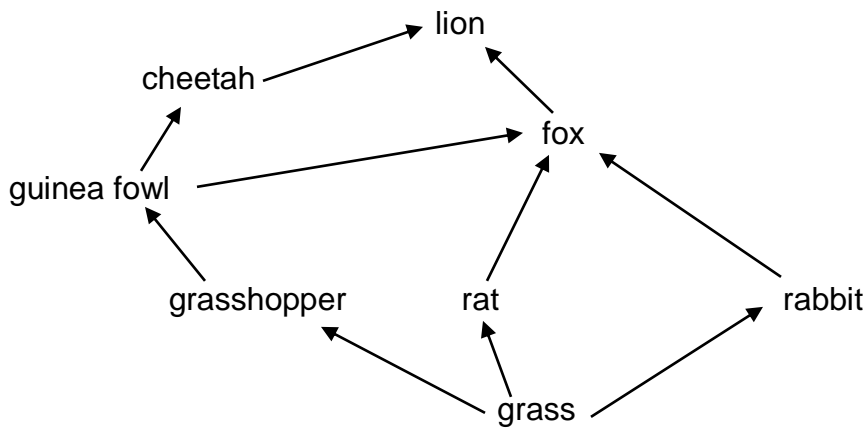
C \_\_\_\_\_

D \_\_\_\_\_

Total 4 marks

**Question 5**

Study the *food web* below and answer the questions.



(a) Construct the longest food chain from the food web

..... (1)

(b) Name the organisms found in the second trophic level

..... (1)

(c) If an outbreak of disease destroys 45% of the guinea fowl population

[i] what would happen to the population of cheetahs?

..... (1)

[ii] Explain your answer to part [i]

.....

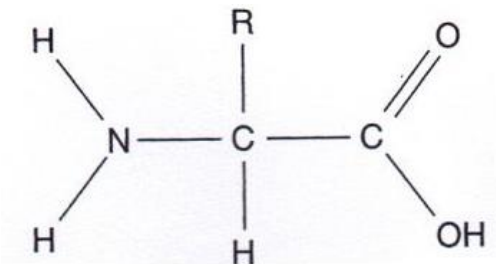
..... (2)

Total 5 marks.



**Question 6**

The diagram shows the structure of an amino acid molecule:-



(a) What does the R represent?

..... (1)

(b) What name is given to a compound formed when *more* than 3, but *less* than 50 amino acids join together?

..... (1)

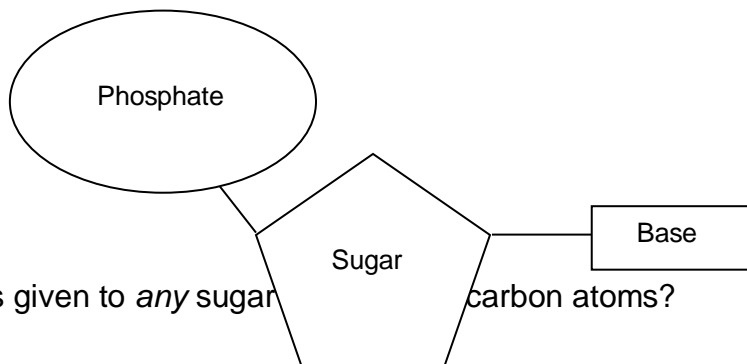
(c) What name is given to a compound formed when *more than* 50 amino acids join together?

..... (1)

(d) Draw a diagram to show 2 amino acids joining together by water loss (condensation.)

Your diagram should give the name of the link (bond) formed between the acids (3)

(e) The diagram shows a **nucleotide**



[i] What name is given to *any* sugar ..... carbon atoms?

..... (1)

[ii] Give two types of compound which contain nucleotides.

..... (2)

[ii] There are 5 possible bases in a nucleotide. Name any **one**.

..... (1)

(f) Most lipids (fats, oils or waxes) are made from compounds called *triglycerides*.

Triglycerides are made from *glycerol* and *fatty acids*.

[i] What name is given to the bond that joins a fatty acid to glycerol?

..... (1)

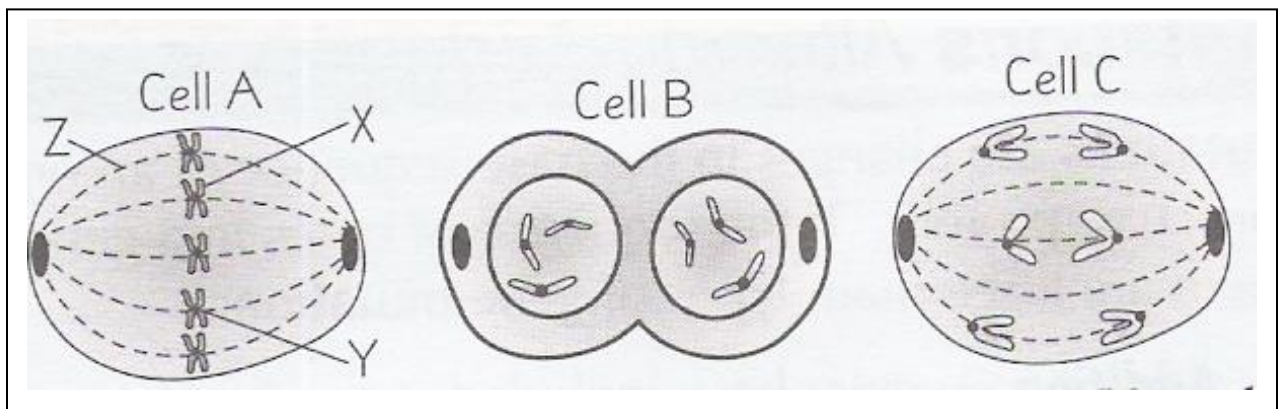
[ii] What type of reaction breaks up lipids into fatty acids and glycerol?

..... (1)

Total 12 marks

**Question 7**

The diagram shows cells at different stages of mitosis.



(a) For each of the cells (A, B, C), state the stage of mitosis the cell is in.

Give a reason for your answer.

A = .....

..... (2)

B = .....

..... (2)

C = .....

..... (2)

(b) Name the structures in **Cell A** labelled **X, Y, Z**

X = \_\_\_\_\_, Y = \_\_\_\_\_, Z = \_\_\_\_\_ (3)

(c) During which stage of the *cell cycle* would *DNA replication* take place?

..... (1)

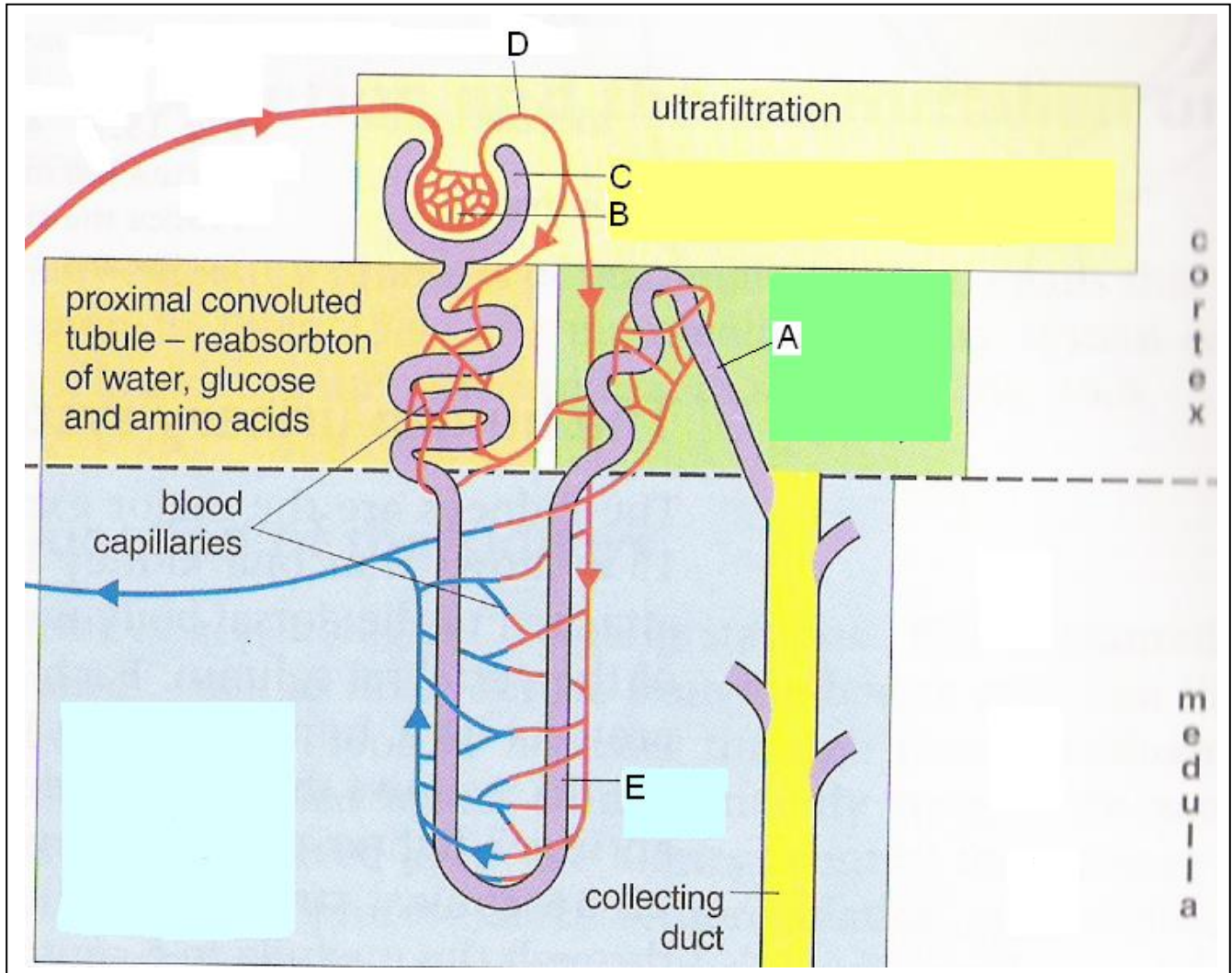
Total 10 marks



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**Question 8**

(a) The diagram below shows a human nephron. Study it and label the structures A, B, C, D,



A ..... B .....

C ..... D .....

E ..... (5)

(c) Name two components of blood present in the *glomerulus filtrate*

..... (1)

..... (1)

Total 7 marks

**Question 9**

The following question is about **respiration**.

(a) What are the properties of a *respiratory surface*?

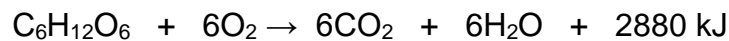
.....  
.....  
.....  
.....

..... (6)

(b) Name the process by which a 6 carbon sugar is converted to pyruvic acid

..... (1)

(c) Aerobic respiration can be summed up by the following biochemical equation:-



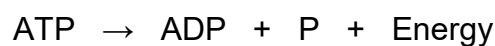
[i] Which *part* of the equation shows *energy release* and what *units* is it measured in?

..... (2)

[ii] Does the process take place in a single step or many steps (multi-step)?

..... (1)

(d) ATP is found as an *energy carrier* in all cells and releases energy by the following equation:-



[i] What are the names of the molecules **ATP** and **ADP** ?

.....(1)

.....(1)

[ii] Does the process take place in a *single step* or *multi-steps* (many steps)?

.....(1)

(e) The energy released is used to transmit nervous impulses. Name 2 other uses of the released energy.

.....(1)

.....(1)

Total 15 marks

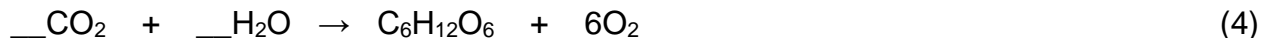
**Question 10**

The following question is about **photosynthesis**.

(a) *Fill in the blanks in the following passage and balance the given equation.*

Photosynthesis can be described as a form of \_\_\_\_\_ nutrition that takes place in the \_\_\_\_\_ of green plants in special organelles named chloroplasts.

It can be summed up by the following biochemical equation:



(b) Photosynthesis takes place in 2 stages, the *light dependent stage* and the *light independent stage*. In which *part* of the *chloroplasts* does each take place?

*Light Dependant Stage*.....(1)

*Light Independant Stage*.....(1)

(c) During the *light dependent stage* water is split by light.

[i] What name is given to this process? ..... (1)

[ii] Complete the given equation for this process



(c) During the *light independent stage* carbon dioxide is converted to carbohydrate with **ATP**.  
What other important biochemical is used in this process?

..... (1)

(d) Apart from *glucose* name **3** other *useful final* products of photosynthesis.

.....  
..... (3)

(e) The rate (speed) at that photosynthesis takes place depends on the *quality* and *quantity* of light. Name **2** *other factors* that change the rate.

..... (1)

..... (1)

Total 15 marks



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