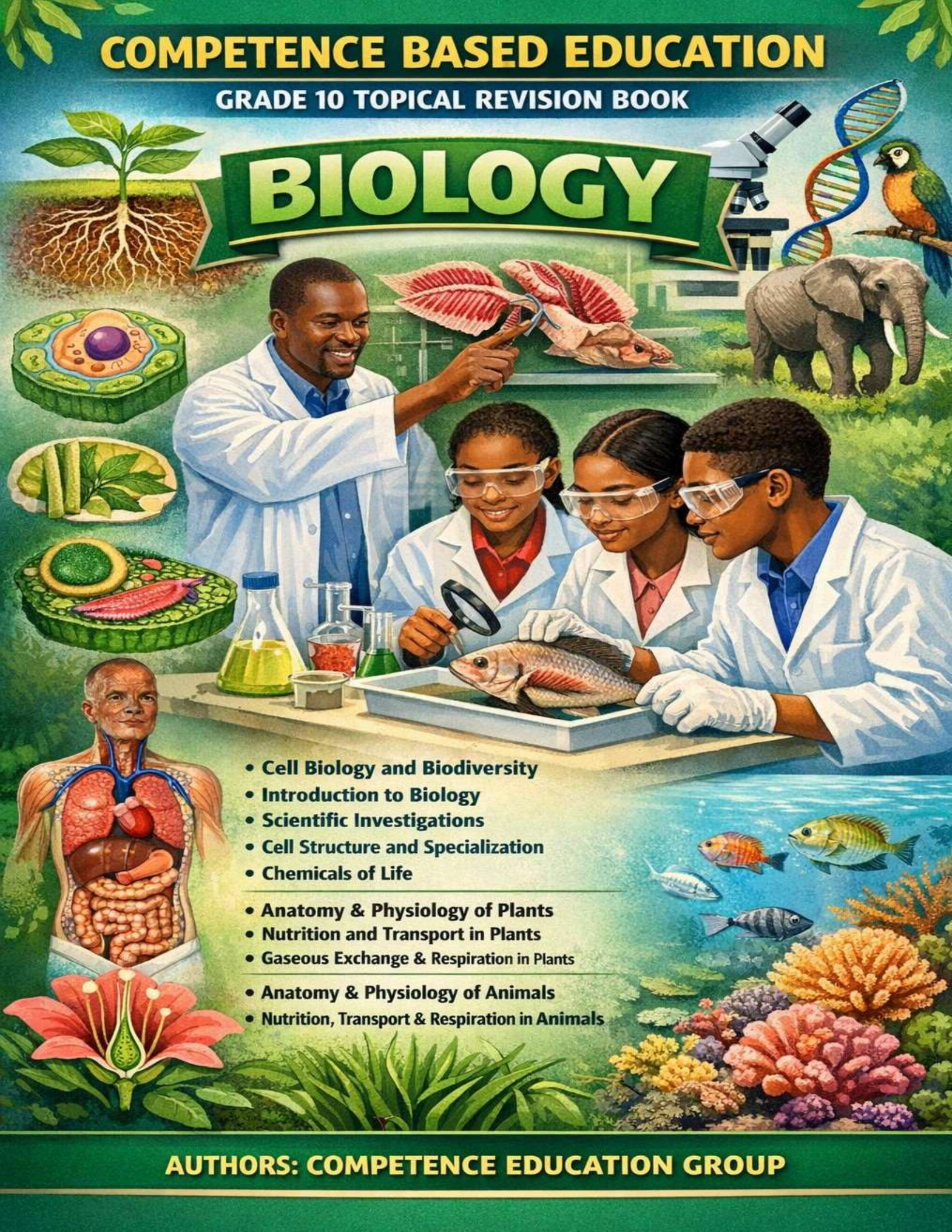


COMPETENCE BASED EDUCATION

GRADE 10 TOPICAL REVISION BOOK

BIOLOGY



- Cell Biology and Biodiversity
 - Introduction to Biology
 - Scientific Investigations
 - Cell Structure and Specialization
 - Chemicals of Life
-
- Anatomy & Physiology of Plants
 - Nutrition and Transport in Plants
 - Gaseous Exchange & Respiration in Plants
-
- Anatomy & Physiology of Animals
 - Nutrition, Transport & Respiration in Animals

AUTHORS: COMPETENCE EDUCATION GROUP

FOR ANSWERS CALL 0743241064

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- ❖ **LESSON PLANS**
- ❖ **SETBOOK QUESTIONS AND ANSWERS**
- ❖ **SETBOOK VIDEOS**
- ❖ **EXAMS**

SUB-STRAND 1.1: INTRODUCTION TO BIOLOGY (50 MARKS)

1. Meaning and Application of Biology

a) Define Biology. (2 marks)

b) Explain **three ways** Biology is applied in everyday life. (6 marks)

i. _____

ii. _____

iii. _____

c) State **two reasons** why Biology is important to human beings. (4 marks)

i. _____

ii. _____

2. Biology in Agriculture and Food Production (10 marks)

a) State **four ways** Biology is used in agriculture. (4 marks)

- i. _____
- ii. _____
- iii. _____
- iv. _____

b) Explain **three ways** Biology helps farmers to increase food production. (6 marks)

- i. _____
- ii. _____
- iii. _____

3. Biology in Health and Medicine (8 marks)

a) State **three ways** Biology is applied in health and medicine. (3 marks)

i. _____

ii. _____

iii. _____

b) Explain **two roles** of Biology in the control and prevention of diseases. (4 marks)

i. _____

ii. _____

c) Give **one example** of a career related to health and medicine that uses Biology. (1 mark)

i. _____

4. Fields of Study in Biology (12 marks)

a) The following are fields of study in Biology:

Botany, Zoology, Taxonomy, Anatomy, Physiology, Ecology, Genetics, Biotechnology, Microbiology, Parasitology, Entomology, Biochemistry.

State the field of Biology that deals with each of the following: (6 marks)

i) Study of plants: _____

ii) Study of animals: _____

iii) Study of insects: _____

iv) Study of parasites: _____

v) Study of classification of organisms: _____

vi) Study of body functions: _____

b) Choose **any three** fields of Biology and for each:

a) state what it studies

b) state one career related to it (6 marks)

5. Careers Related to Biology (4 marks)

a) State **four careers** related to Biology. (4 marks)

i. _____

ii. _____

iii. _____

iv. _____

6. Career Choice (4 marks)

a) State **two factors** that should influence career choice. (2 marks)

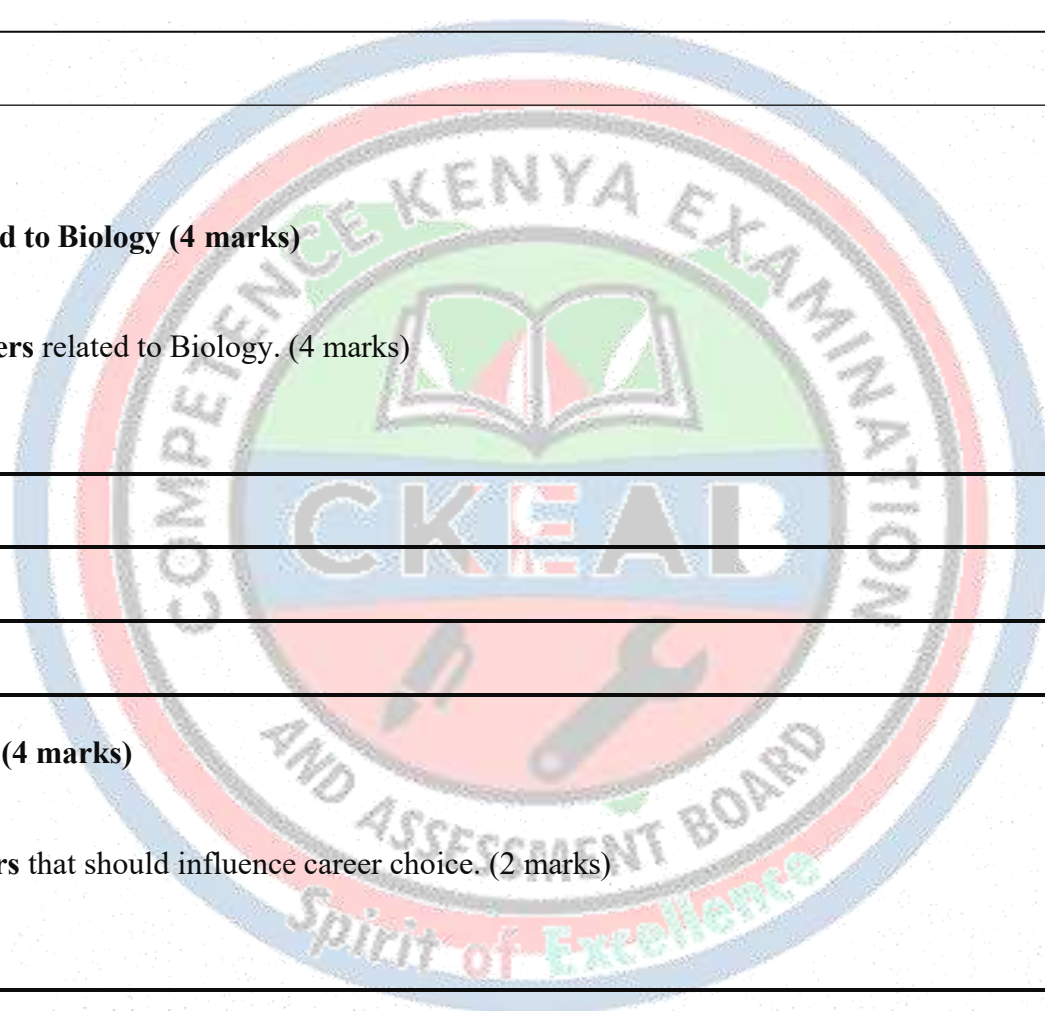
i. _____

ii. _____

b) State **two factors** that should NOT influence career choice. (2 marks)

i. _____

ii. _____



INTRODUCTION TO BIOLOGY (100 MARKS)

QUESTION 1: Meaning and Application of Biology (15 marks)

a) Define the term **parasitology**. (2 marks)

b) State **five applications** of Biology in everyday life. (5 marks)

i. _____

ii. _____

iii. _____

iv. _____

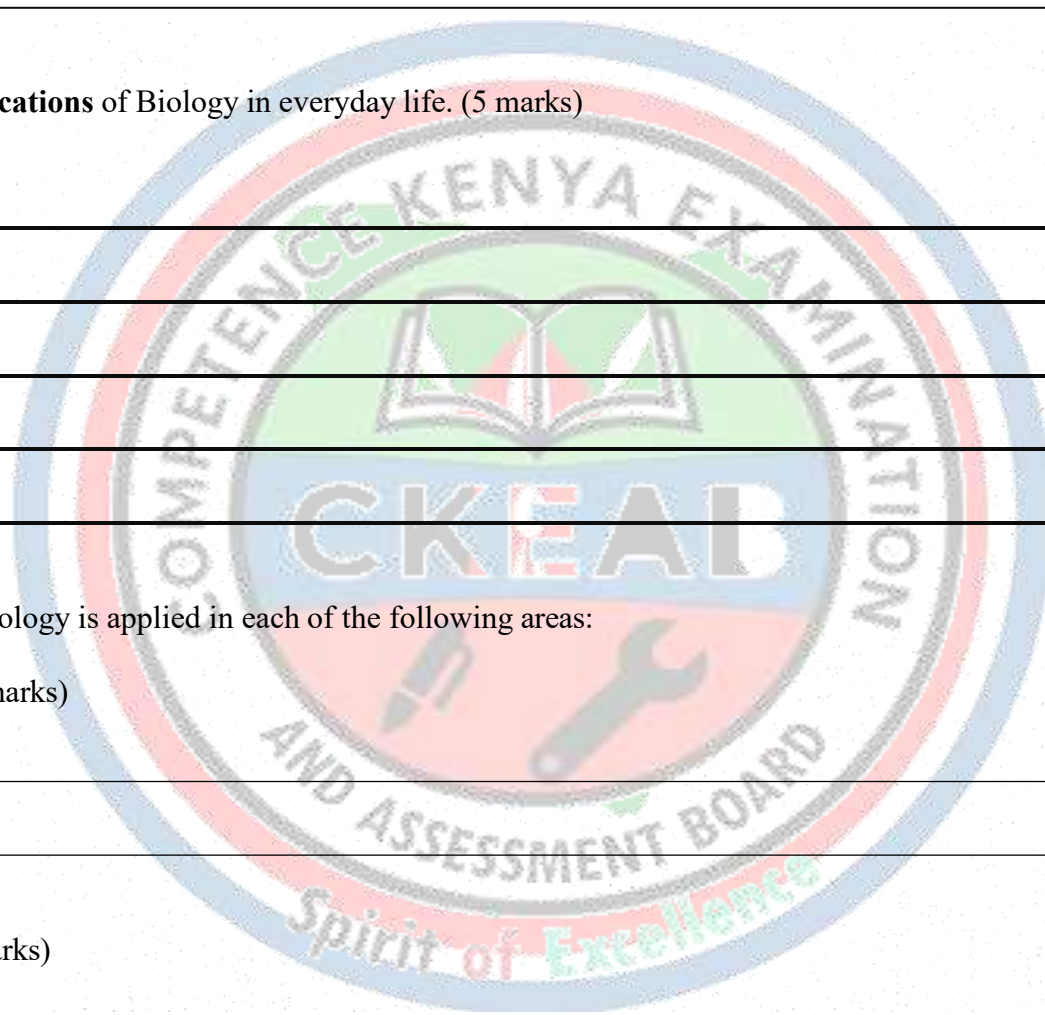
v. _____

c) Explain how Biology is applied in each of the following areas:

i) Agriculture (2 marks)

ii) Medicine (2 marks)

iii) Environmental conservation (2 marks)



d) Give **two reasons** why Biology is important to human beings. (2 marks)

- i. _____
- ii. _____

QUESTION 2: Biology in Daily Life (10 marks)

a) State **four ways** Biology helps people to live healthy lives. (4 marks)

- i. _____
- ii. _____
- iii. _____
- iv. _____

b) Explain **three ways** Biology helps in improving food production. (3 marks)

- i. _____
- ii. _____
- iii. _____

c) State **three ways** Biology contributes to environmental protection. (3 marks)

- i. _____
- ii. _____
- iii. _____
- iv. _____

QUESTION 3: Fields of Study in Biology (20 marks)

a) Name **ten fields of study** in Biology. (10 marks)

- i. _____
- ii. _____

- iii. _____
- iv. _____
- v. _____
- vi. _____
- vii. _____
- viii. _____
- ix. _____
- x. _____

b) Match the field of study in Biology with the correct description: (10 marks)

Field	Description
Botany	
Zoology	
Ecology	
Genetics	
Microbiology	

QUESTION 4: Biology Fields and Careers (25 marks)

a) State the career related to each field below: (10 marks)

i) Botany (1 mark)

ii) Zoology (1 mark)

iii) Taxonomy (1 mark)

v) Anatomy (1 mark)

v) Physiology (1 mark)

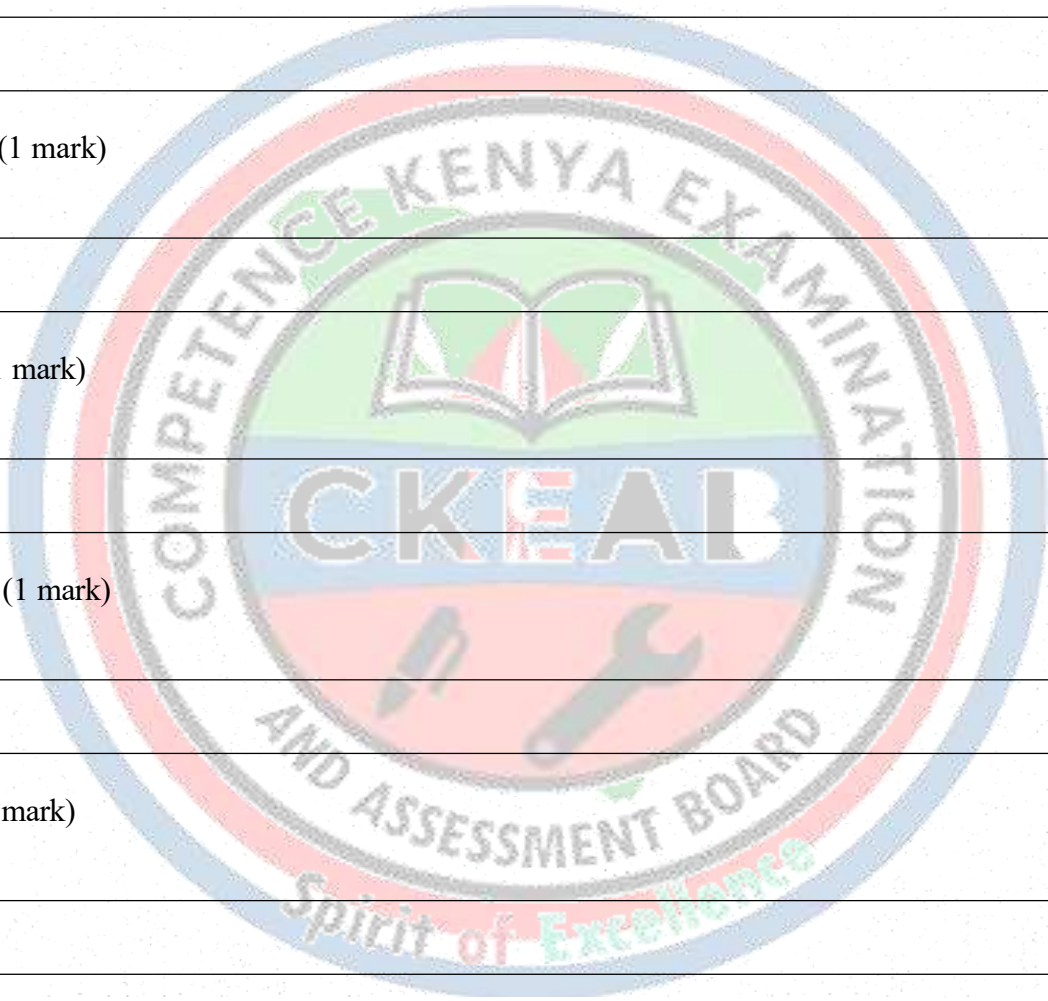
vi) Biotechnology (1 mark)

vii) Parasitology (1 mark)

viii) Microbiology (1 mark)

ix) Entomology (1 mark)

x) Ecology (1 mark)



b) Explain the work done by the following professionals: (9 marks)

i) Microbiologist (3 marks)

ii) Geneticist (3 marks)

iii) Ecologist (3 marks)

c) Give **three examples** of careers that combine Biology with other subjects. (3 marks)

i. _____

ii. _____

iii. _____

QUESTION 5: Career Choice Factors (15 marks)

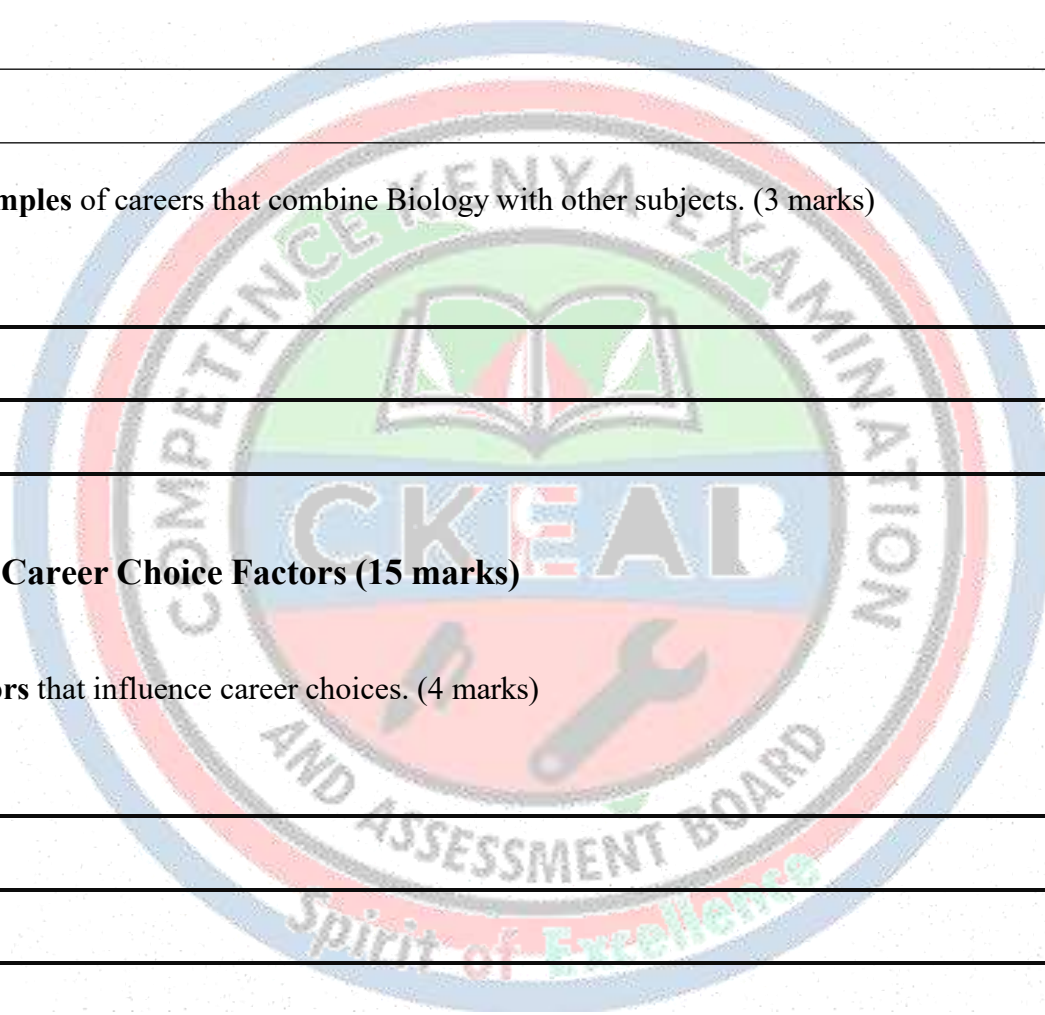
a) State **four factors** that influence career choices. (4 marks)

i. _____

ii. _____

iii. _____

iv. _____



b) Explain how each of the following influences career choice: (4 marks)

i) Interest

ii) Ability

c) State **five factors** that should NOT influence career choices. (5 marks)

i. _____

ii. _____

iii. _____

iv. _____

v. _____

d) Give **two reasons** why gender should not determine career choice. (2 marks)

i. _____

ii. _____

QUESTION 6: Career Wheel / Career Mapping (15 marks)

a) What is a **career wheel**? (2 marks)

b) State **three uses** of a career wheel in learning Biology. (3 marks)

- i. _____
- ii. _____
- iii. _____

c) Draw a career wheel showing **6 Biology fields** and their related careers. (10 marks)



SUB-STRAND 1.2: SPECIMEN COLLECTION AND PRESERVATION

1. Apparatus and Materials for Collecting Specimens (20 marks)

a) Define a biological specimen. (2 marks)

b) State **six apparatus/materials** used in collecting biological specimens. (6 marks)

i. _____

ii. _____

iii. _____

iv. _____

v. _____

vi. _____

c) Match the apparatus in List A with its use in List B. (8 marks)

List A

- | | |
|---------------------------|---|
| i) Pooter/aspirator | Cutting plant twigs and stems |
| ii) Pitfall trap | Collecting flying insects |
| iii) Sweep net/aerial net | Picking small specimens without touching |
| iv) Hand lens | Collecting insects attracted by light |
| v) Forceps | Collecting tiny insects by sucking safely |
| vi) Secateurs | Collecting crawling insects from soil surface |
| vii) Tullgren funnel | Magnifying small parts of specimens |
| viii) Light trap | Extracting insects from leaf litter/soil |

d) State **two safety precautions** to observe when collecting specimens. (4 marks)

- i. _____
- ii. _____

2. Collection of Plant Specimens (Herbarium Work) (18 marks)

a) Name **four plant parts** that may be collected as specimens for a herbarium. (4 marks)

- i. _____
- ii. _____
- iii. _____
- iv. _____

b) Outline **five steps** followed when making a herbarium specimen. (10 marks)

- i. _____
- ii. _____
- iii. _____
- iv. _____
- v. _____

c) State **two reasons** why labeling is important in herbarium preparation. (4 marks)

- i. _____
- ii. _____

3. Collection of Animal Specimens (Small Animals) (20 marks)

a) State **five methods/apparatus** used to collect small animals. (5 marks)

- i. _____
- ii. _____
- iii. _____

iv. _____

v. _____

b) Explain how the following apparatus are used to collect specimens: (9 marks)

i) Pitfall trap (3 marks)

i. _____

ii. _____

iii. _____

ii) Pooter/aspirator (3 marks)

i. _____

ii. _____

iii. _____

iii) Sweep net/aerial net (3 marks)

i. _____

ii. _____

iii. _____

c) State **three reasons** why a learner should wear gloves when collecting animal specimens. (3 marks)

i. _____

ii. _____

iii. _____

d) Give **three examples** of small animals that can be collected for biological study. (3 marks)

i. _____

ii. _____

iii. _____

4. Processing and Preservation of Specimens (22 marks)

a) What is meant by processing of specimens? (2 marks)

b) State **four activities** done when processing animal specimens before preservation. (4 marks)

i. _____

ii. _____

iii. _____

iv. _____

c) Explain **two methods** of preserving specimens. (6 marks)

d) Name **two preservatives** used in wet preservation of specimens. (2 marks)

i. _____

ii. _____

e) Explain **how ethanol is used** to preserve animal specimens. (4 marks)

i. _____

ii. _____

iii. _____

iv. _____

f) State **four importance** of collecting, processing and preserving specimens in Biology. (4 marks)

i. _____

ii. _____

iii. _____

iv. _____

5. Improvisation of Apparatus (10 marks)

a) Explain the meaning of improvisation in specimen collection. (2 marks)

b) State **four reasons** why learners may improvise specimen collection apparatus. (4 marks)

i. _____

ii. _____

iii. _____

iv. _____

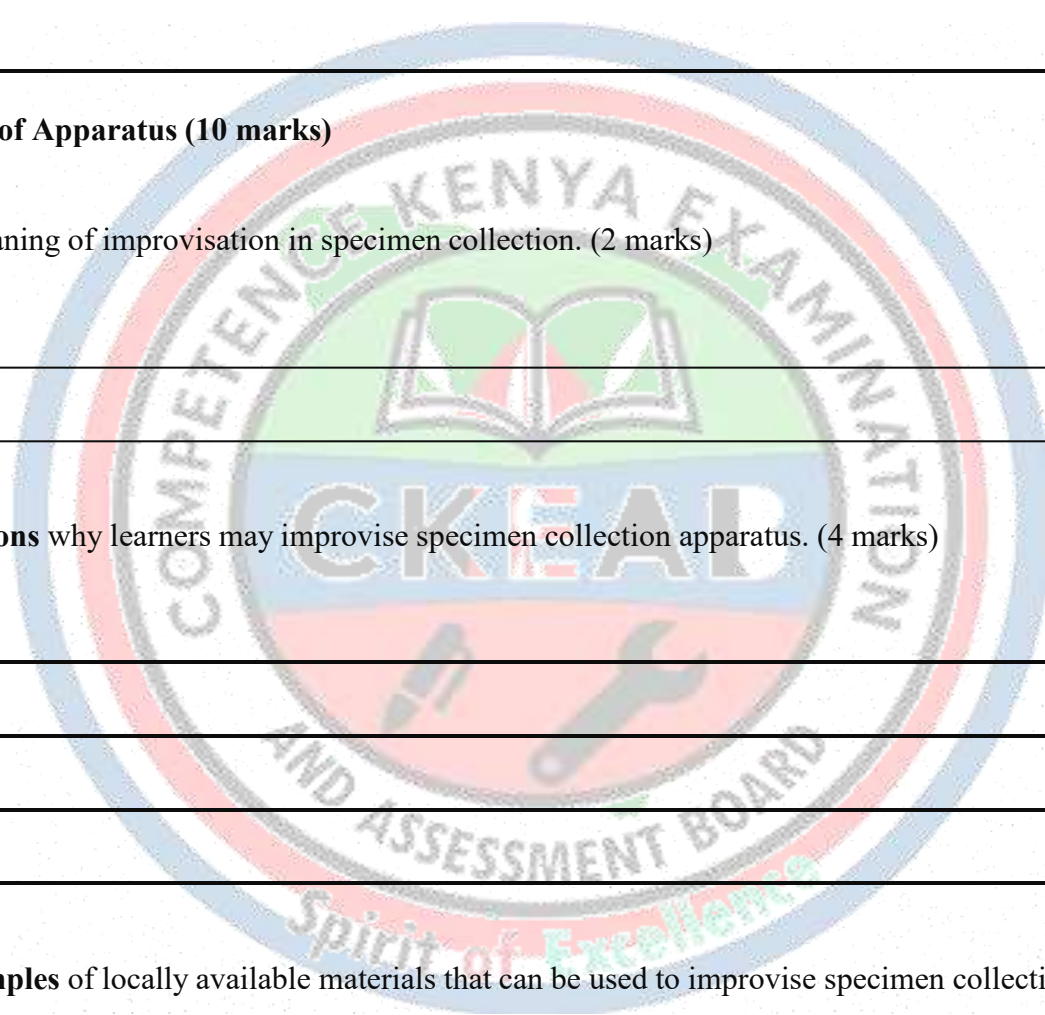
c) Give **four examples** of locally available materials that can be used to improvise specimen collection tools. (4 marks)

i. _____

ii. _____

iii. _____

iv. _____



6. Project Work: Collecting and Preserving Specimens (10 marks)

A learner plans to carry out a project on collecting, processing and preserving biological specimens.

a) State **four items** that should be included in the project plan. (4 marks)

i. _____

ii. _____

iii. _____

iv. _____

b) State **three financial literacy activities** that the learner should carry out during the project. (3 marks)

i. _____

ii. _____

iii. _____

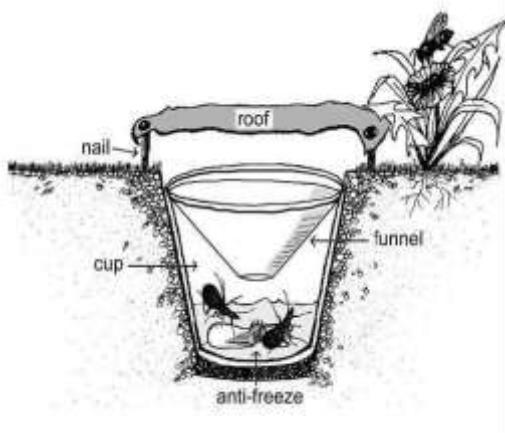
c) Explain why keeping a portfolio is important during the specimen project. (3 marks)

i. _____

ii. _____

iii. _____

d) Below are some of the common apparatus used to collect the specimen? Use it to answer the questions that follow.



i.

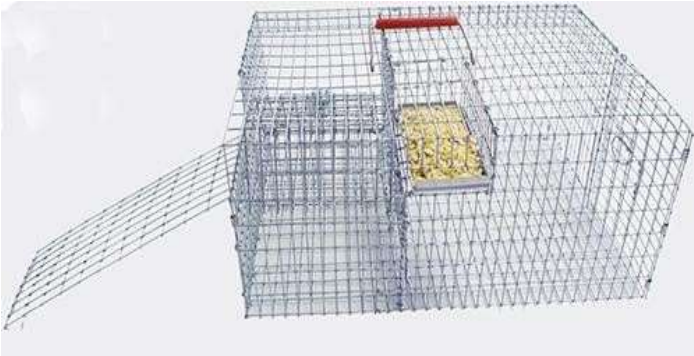
i. Name the apparatus. _____ (1 mark)

ii. Give two functions of the roof in the apparatus. (2 marks)

i. _____

ii. _____

ii. study the apparatus shown below



i. Name the apparatus shown in (b) above (1 mark)

ii. Give the role of the apparatus named in (b) (i) above.(1mark)

i. _____

ii. _____

iii. _____



STRAND 1.0: CELL BIOLOGY AND BIODIVERSITY

SUB-STRAND 1.3: CELL STRUCTURE AND SPECIALIZATION

QUESTION 1: Microscopes (Light vs Electron) (20 marks)

(a) State FOUR differences between a light microscope and an electron microscope. (8 marks)

- i. _____
- ii. _____
- iii. _____
- iv. _____

(b) Explain the meaning of the following terms as used in microscopy: (6 marks)

i) Magnification (3 marks)

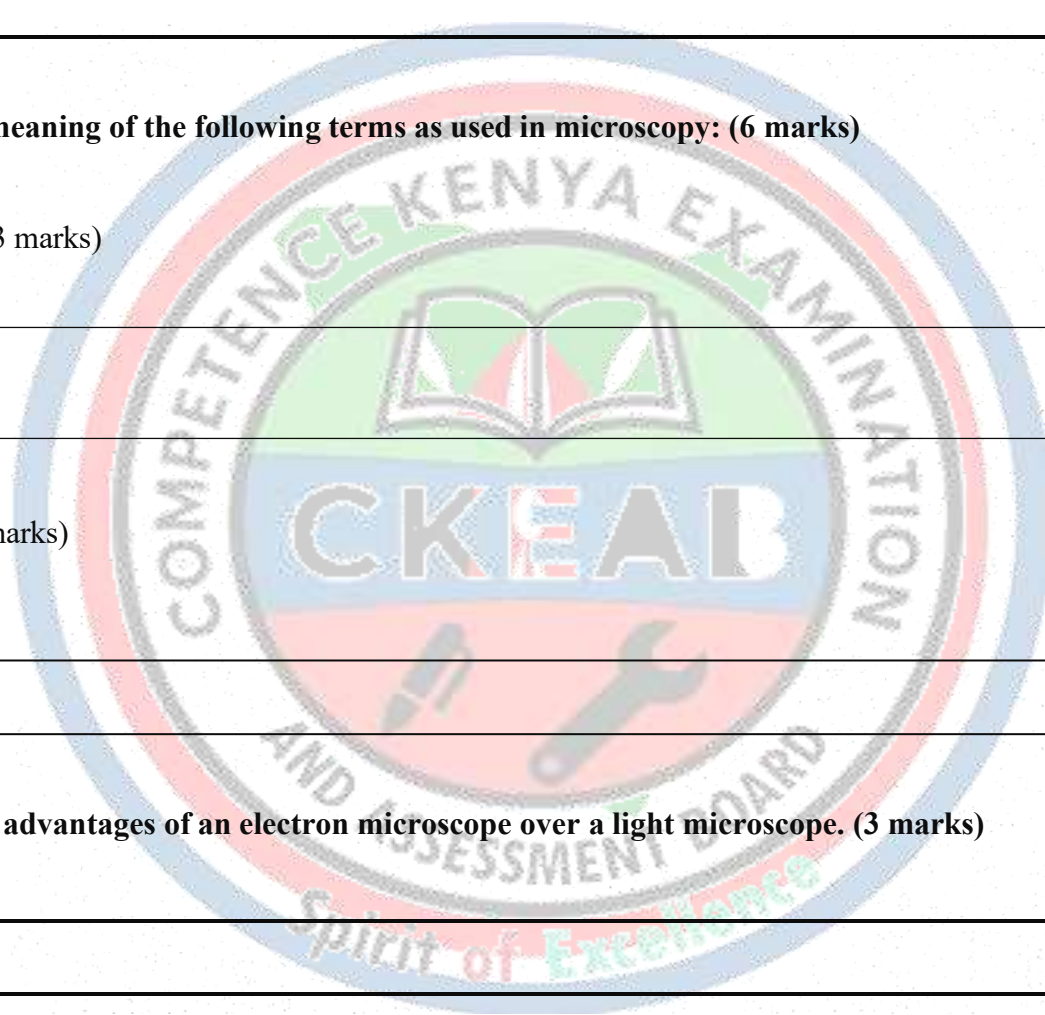
ii) Resolution (3 marks)

(c) State THREE advantages of an electron microscope over a light microscope. (3 marks)

- i. _____
- ii. _____
- iii. _____

(d) State THREE limitations of using an electron microscope in school laboratories. (3 marks)

- i. _____
- ii. _____
- iii. _____

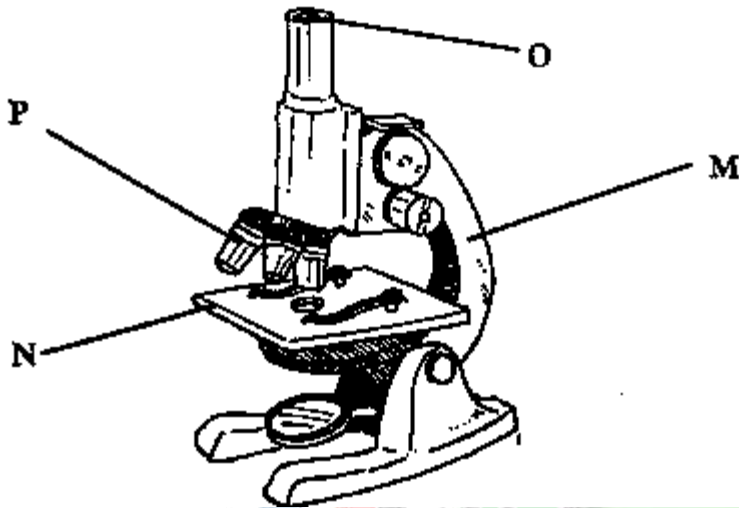


(e) Identify the part of light microscope which serve each of the functions described below

a) Making rough focus _____(1mark)

b) Reflecting light from the source _____(1 mark)

(f) Below is a diagram of a light microscope. name the parts marked M, N, O and P.



M: _____ N: _____

O: _____ P: _____

QUESTION 2: Preparation of Temporary Slides (18 marks)

(a) State FOUR materials/apparatus needed to prepare a temporary slide for microscopy. (4 marks)

- i. _____
- ii. _____
- iii. _____
- iv. _____

(b) Outline SIX steps used when preparing a temporary slide of an onion epidermis. (12 marks)

- i. _____
- ii. _____
- iii. _____
- iv. _____
- v. _____
- vi. _____

(c) State TWO precautions to take when preparing a temporary slide. (2 marks)

i. _____

ii. _____

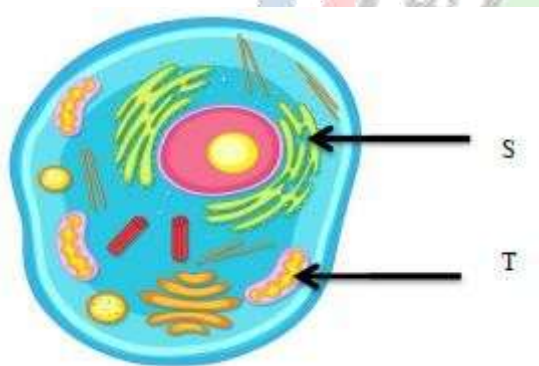
QUESTION 3: Estimation of Cell Size (12 marks)

(a) A science teacher provided learners with a prepared temporary slide of a cheek cell and a prepared temporary slide of an onion epidermal cell.

(i) State two organelles that would be clearly visible in both cells under a light microscope. (2 marks)

(ii) Describe the process of preparing a temporary slide of an onion epidermal cell for observation under a light microscope. (3 marks)

iii) Identify the following parts of a cell (2 marks)



S: _____ T: _____

(b) State TWO other cell structures that can be seen using a light microscope in an onion epidermal cell. (2 marks)

i. _____

ii. _____

(c) A student measured the length of the cell in Diagram 1 as 40 mm using a ruler.

The magnification used was $\times 400$.

Calculate the actual length of the cell in micrometres (μm). (6 marks)

(d) State **THREE** reasons why estimating cell size is important in Biology. (3 marks)

- i. _____
- ii. _____
- iii. _____

e) A form one student observing Onion epidermal cells under the low power objective Counted 5 cells on a field of view measuring 5mm.

i) Estimate the size of one cell. (3marks)

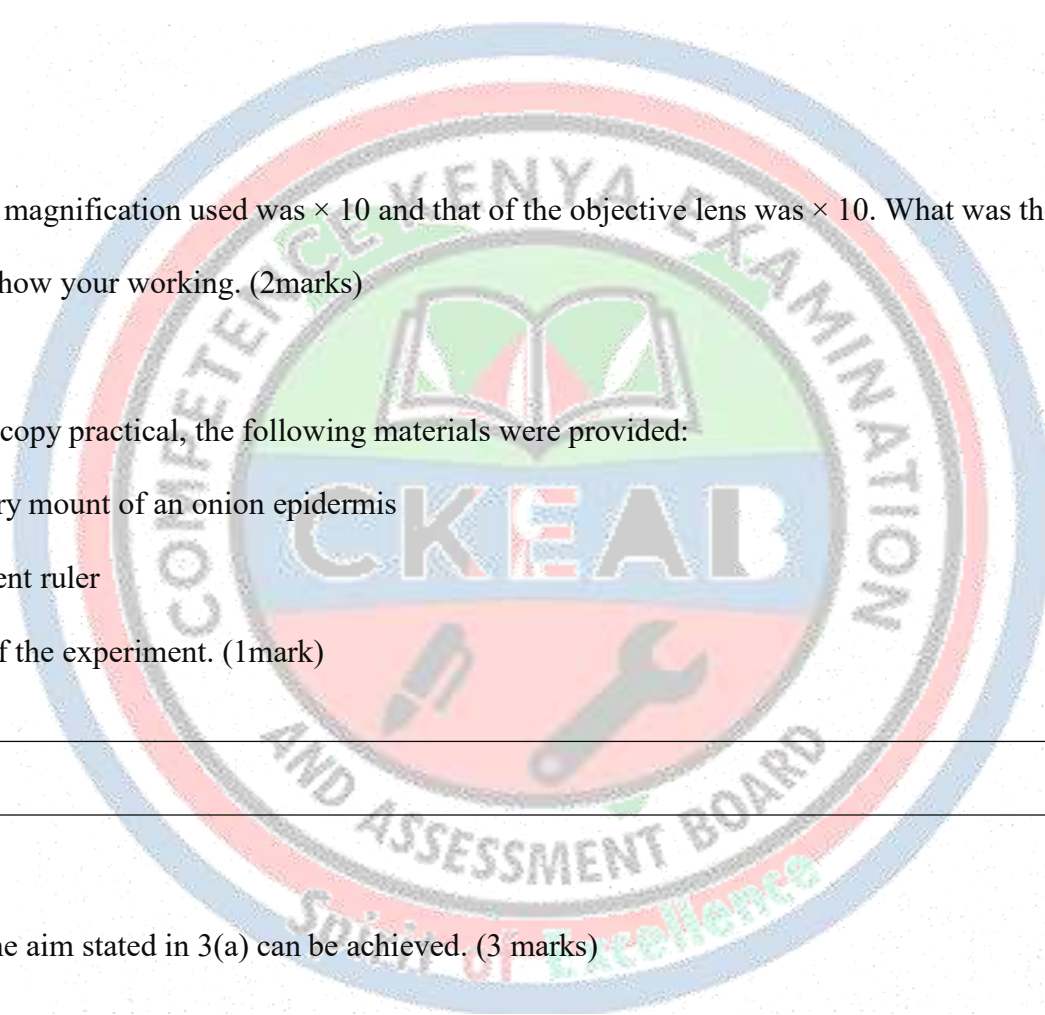
ii) If the eye piece magnification used was $\times 10$ and that of the objective lens was $\times 10$. What was the magnification of the microscope? Show your working. (2marks)

f) During a microscopy practical, the following materials were provided:

- i. A temporary mount of an onion epidermis
- ii. A transparent ruler

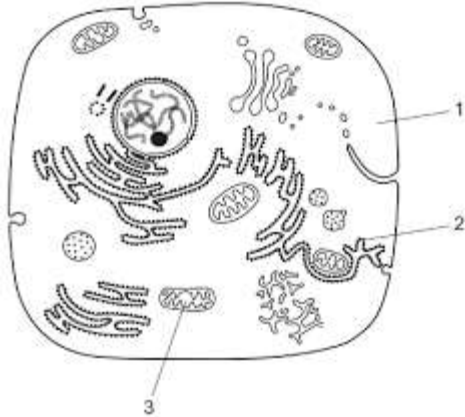
(a) State the aim of the experiment. (1mark)

(b) Explain how the aim stated in 3(a) can be achieved. (3 marks)



QUESTION 4: Plant and Animal Cells (Electron Microscope) (20 marks)

(a) The diagram below shows a certain cell. Use it to answer the questions that follow.



i. Identify the cell. (1 mark)

ii. Give two reasons for your answer in (a) above. (2 marks)

iii. Name the structures labeled 1, 2 (2 marks)

1: _____

2: _____

iv. State the function of the part labeled 3 (1 mark)

b) Name organelles visible in plant cell but absent in animal cell _____

i. _____

ii. _____

(c) State FOUR differences between plant and animal cells. (8 marks)

- i. _____
- ii. _____
- iii. _____
- iv. _____

(d) State TWO similarities between plant and animal cells. (2 marks)

- i. _____
- ii. _____
- iii. _____
- iv. _____
- v. _____
- vi. _____

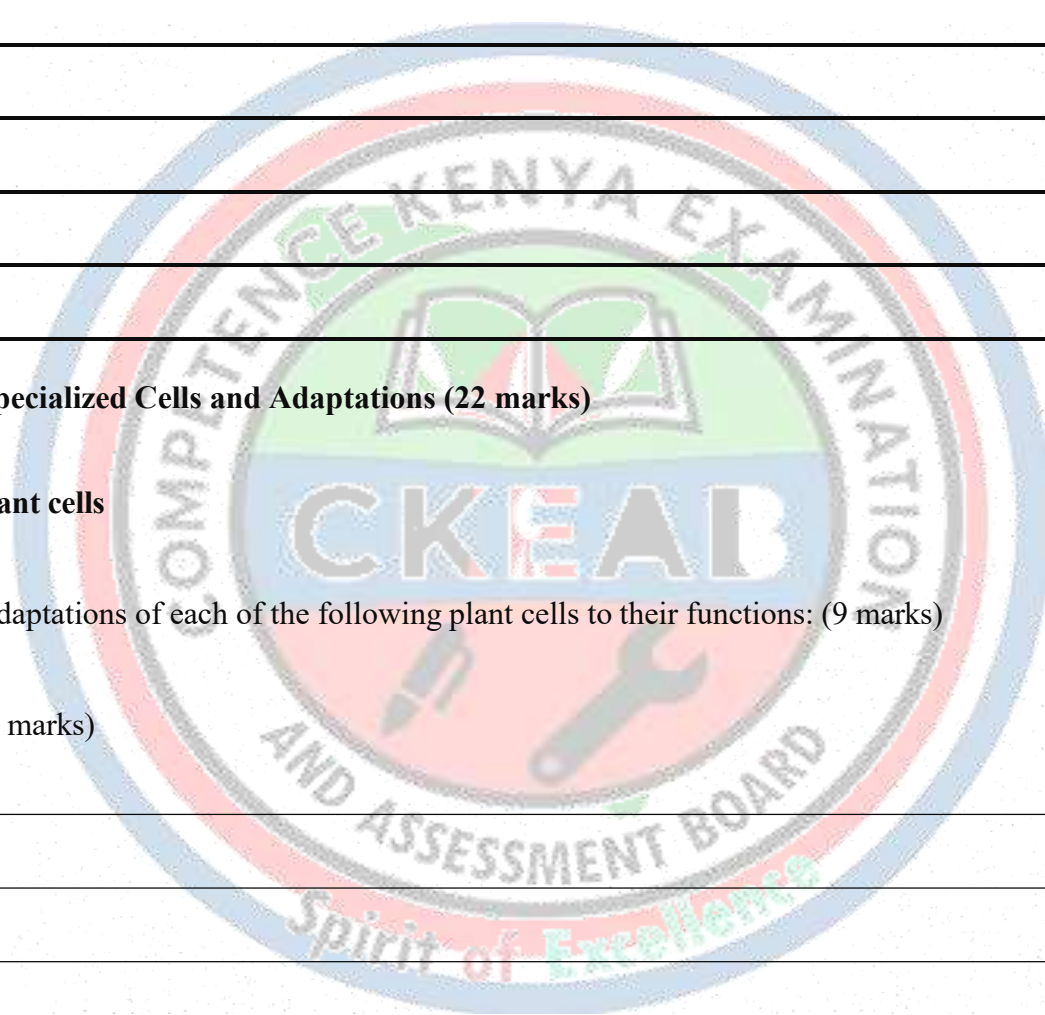
QUESTION 5: Specialized Cells and Adaptations (22 marks)

(a) Specialized plant cells

Explain THREE adaptations of each of the following plant cells to their functions: (9 marks)

i) Root hair cell (3 marks)

ii) Palisade mesophyll cell (3 marks)



iii) Guard cells (3 marks)

(b) Specialized animal cells

Explain THREE adaptations of each of the following animal cells to their functions: (9 marks)

i) Red blood cell (3 marks)

ii) Nerve cell (3 marks)

iii) Sperm cell (3 marks)

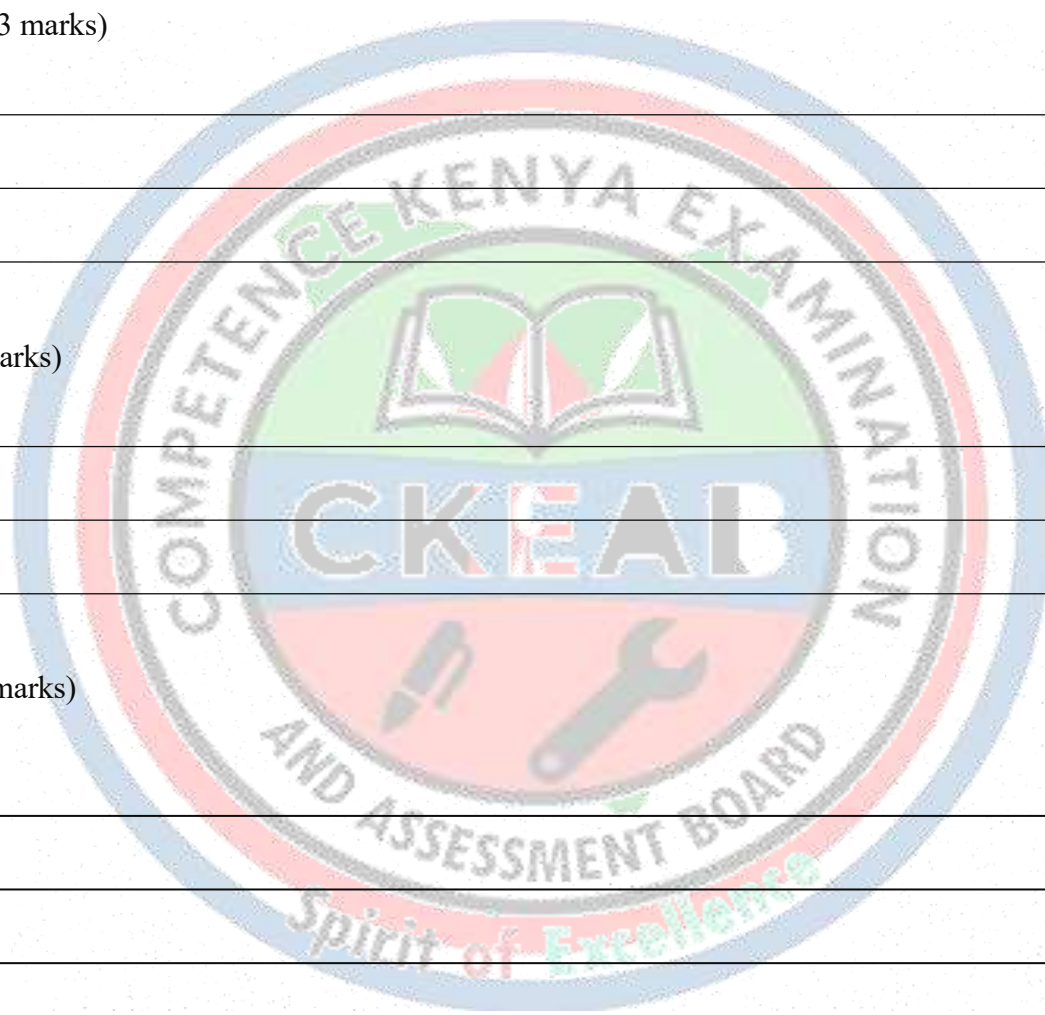
(c) State FOUR reasons why cells become specialized. (4 marks)

i. _____

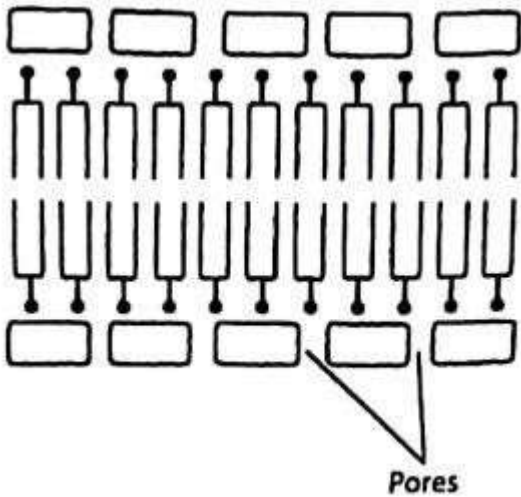
ii. _____

iii. _____

iv. _____



d) The following diagram represents part of a cell structure as seen under an electron microscope.



1. Identify the structure represented. _____ (1 mark)
2. State two functions of the structure. (2 marks)

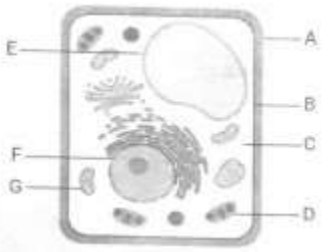
3. Suggest two ways in which the functioning of the structure can be impaired. (2 marks)

4. Name two structures found in plant cells but not in animal cells. (2 marks)

(e) What is the purpose of staining cells before observing them under a light microscope? (1 mark)

f) Grade 10 learners at Vision Senior School were observing plant and animal cells under a light microscope.

a. They observed a plant cell as shown below



Name the parts Labelled B, D and F (3 marks)

B: _____

D: _____

F: _____

b. Draw and label an animal cell as they saw it under a light microscope. (3 marks)



QUESTION 6: Cell Organisation (8 marks)

(a) Arrange the following from the simplest to the most complex: (4 marks)

Organ, Tissue, Cell, Organ system, Organelle

b) Define a(n):

i. Organism :

ii. Organ System

iii. Cell:

iv. Tissue

v. Organelle

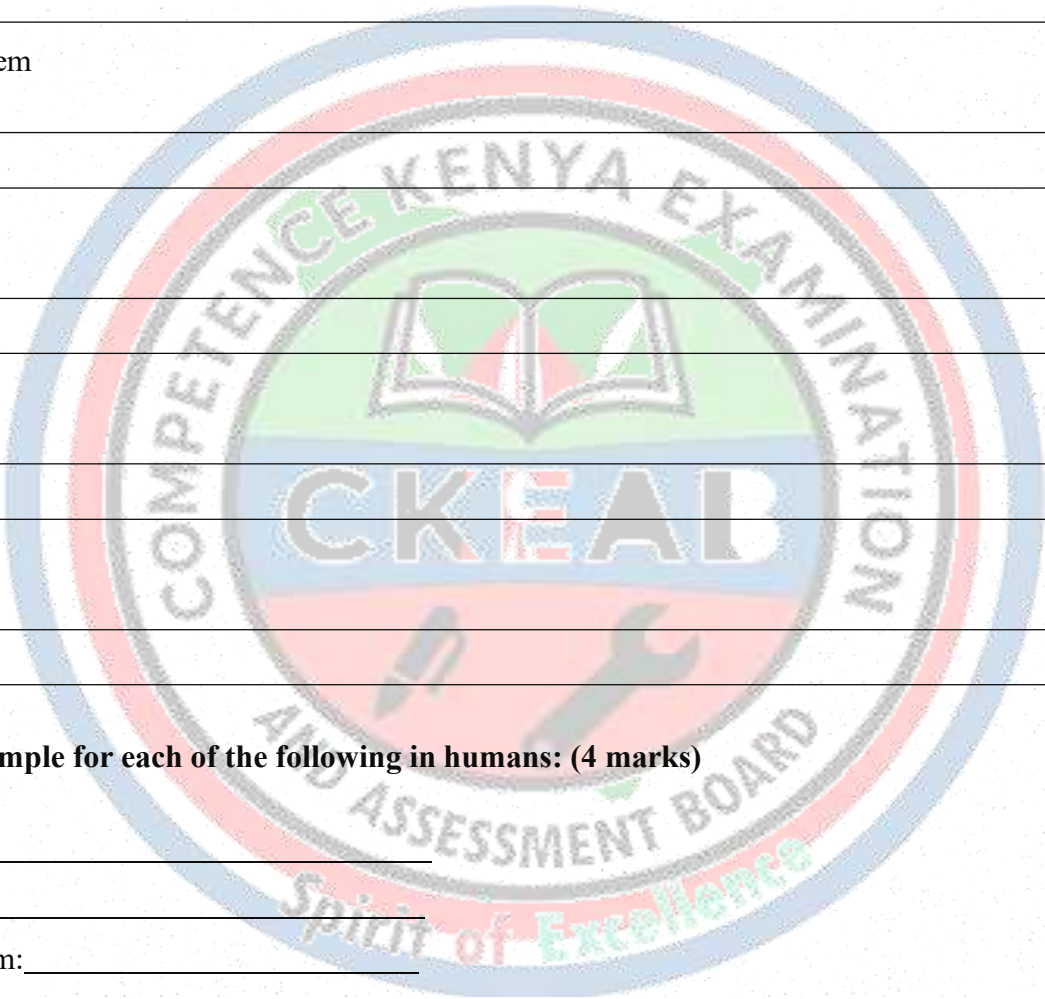
(b) Give ONE example for each of the following in humans: (4 marks)

i) A tissue: _____

ii) An organ: _____

iii) An organ system: _____

iv) A cell: _____



SUB-STRAND 1.4: CHEMICALS OF LIFE

QUESTION 1: Carbohydrates (16 marks)

(a) Define carbohydrates. (2 marks)

(b) State FOUR properties of carbohydrates. (4 marks)

- i. _____
- ii. _____
- iii. _____
- iv. _____

(c) State FIVE functions of carbohydrates in living organisms. (5 marks)

- i. _____
- ii. _____
- iii. _____
- iv. _____
- v. _____

(d) Complete the table below. (5 marks)

Type of carbohydrate	One example	One function
Monosaccharide		
Disaccharide		
Polysaccharide		

QUESTION 2: Lipids (12 marks)

(a) State FOUR properties of lipids. (4 marks)

- i. _____
- ii. _____
- iii. _____
- iv. _____

(b) State FOUR functions of lipids in the body. (4 marks)

- i. _____
- ii. _____
- iii. _____
- iv. _____

(c) Explain TWO differences between fats and oils. (4 marks)

- i. _____
- ii. _____

QUESTION 3: Proteins and Vitamins (16 marks)

(a) State FOUR properties of proteins. (4 marks)

- i. _____
- ii. _____
- iii. _____
- iv. _____

(b) State FOUR functions of proteins in living organisms. (4 marks)

- i. _____
- ii. _____
- iii. _____
- iv. _____

(c) State THREE sources of proteins in the diet. (3 marks)

- i. _____
- ii. _____
- iii. _____

(d) State THREE functions of vitamins in the body. (3 marks)

- i. _____
- ii. _____
- iii. _____

(e) Name TWO deficiency diseases caused by lack of vitamins. (2 marks)

- i. _____
- ii. _____

QUESTION 4: Food Tests (Diagrams Included) (18 marks)

A learner carried out food tests on the samples and obtained the results shown below.

Sample	Test done	Observation	Inference
A	Benedict's test	Brick-red precipitate formed	
B	Iodine test	Blue-black colour formed	
C	Emulsion test	White milky emulsion formed	
D	DCPIP test	Blue solution turned colourless	

(a) Complete the inference column for samples A, B, C and D. (4 marks)

(b) State the food substance being tested in: (4 marks)

- i) Benedict's test: _____
- ii) Iodine test: _____
- iii) Emulsion test: _____
- iv) DCPIP test: _____

(c) Outline the procedure of carrying out: (6 marks)

i) Benedict's test (3 marks)

- i. _____
- ii. _____
- iii. _____

ii) Iodine test (3 marks)

- i. _____
- ii. _____
- iii. _____

(d) Give TWO locally available food substances that would give a positive result for: (4 marks)

i) Benedict's test (2 marks)

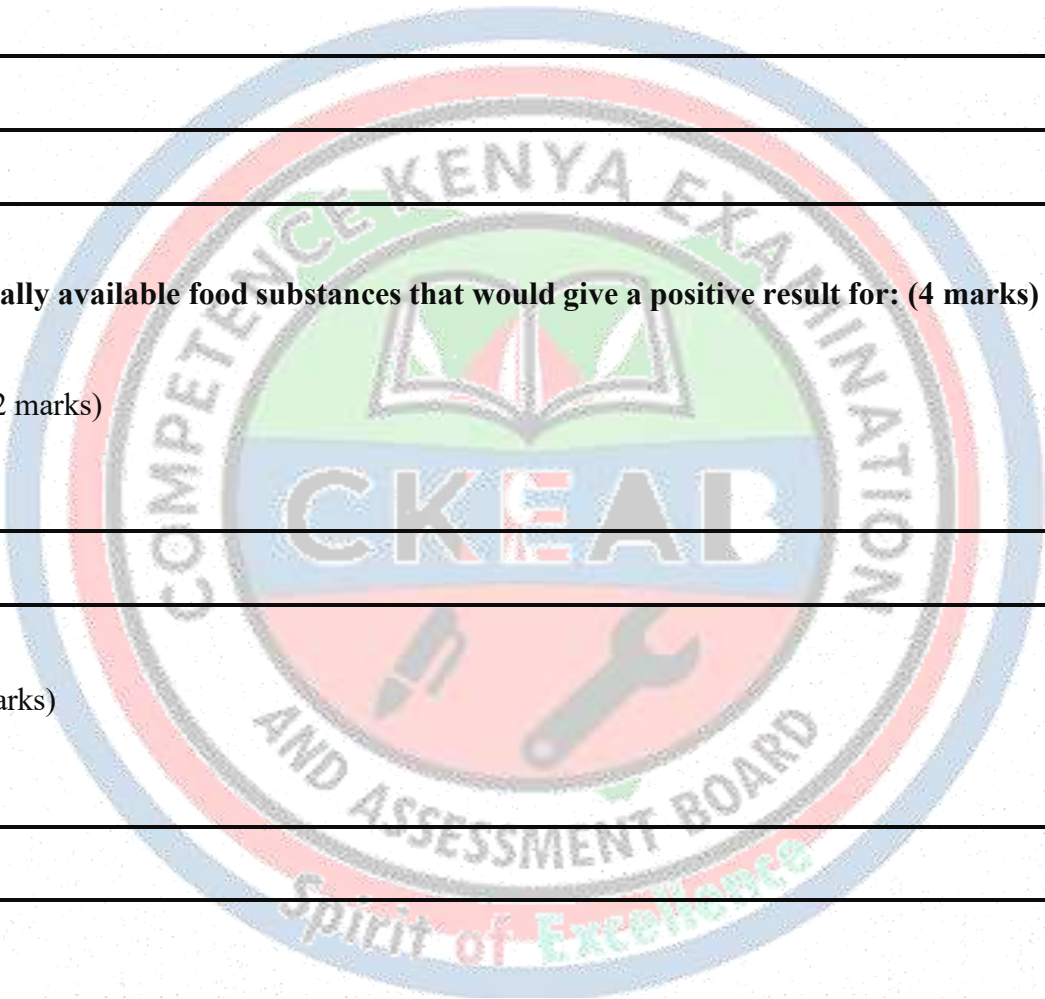
- i. _____
- ii. _____

ii) Iodine test (2 marks)

- i. _____
- ii. _____

e) You are provided with a substances labeled **N,P,Q,V** and **W**. **N** is Benedict's solution, **P** is dilute hydrochloric acid, **Q** is sodium hydrogen carbonate solution, suspensions **V** and **W** are test solutions.

i. Using the reagents provided, test for the food substances in the suspension. In the table below, record the food tested, Procedures, observations conclusions. (10 mks).



Substance	Food substance being tested for	Procedure	Observations	Conclusion
V				
W				

ii. Name one enzyme that may be required to digest suspension **W** in the alimentary canal in human beings. State the organ from which the enzyme is produced. (2 marks)

Enzyme	Organ Producing the enzyme
.....

iii. State the role of the following in the experiment:

- a. Substance Q (2 marks)
- b. Substance P (1 mark)

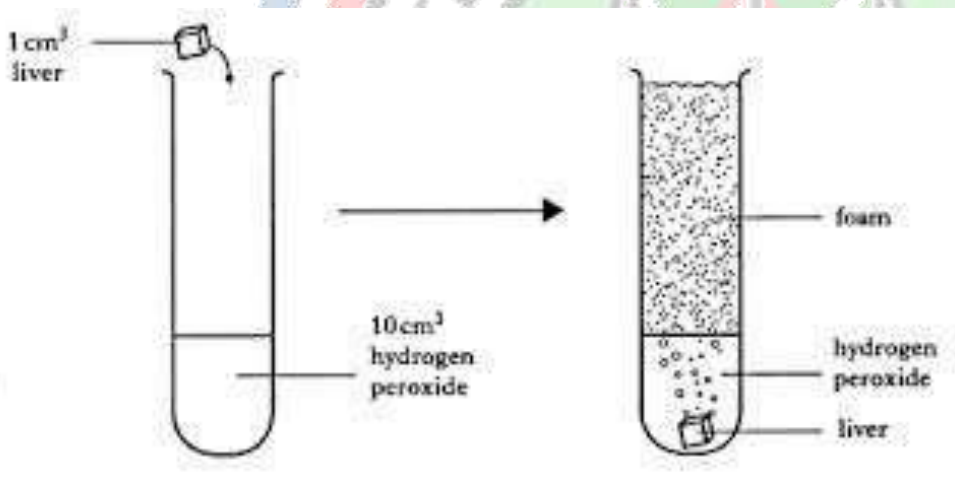
QUESTION 5: Enzymes (Meaning and Catalase Experiment) (16 marks)

(a) Define an enzyme. (2 marks)

(b) State THREE characteristics of enzymes. (3 marks)

- i. _____
- ii. _____
- iii. _____

(c) Diagram 2 shows an experiment to investigate the presence of catalase in liver tissue.



i) What observation is made in this experiment? (2 marks)

ii) Name the gas produced. (1 mark)

iii) Write the word equation for the reaction. (3 marks)

iv) Explain why the reaction is faster when liver is used than when potato is used. (3 marks)

i. _____

ii. _____

iii. _____

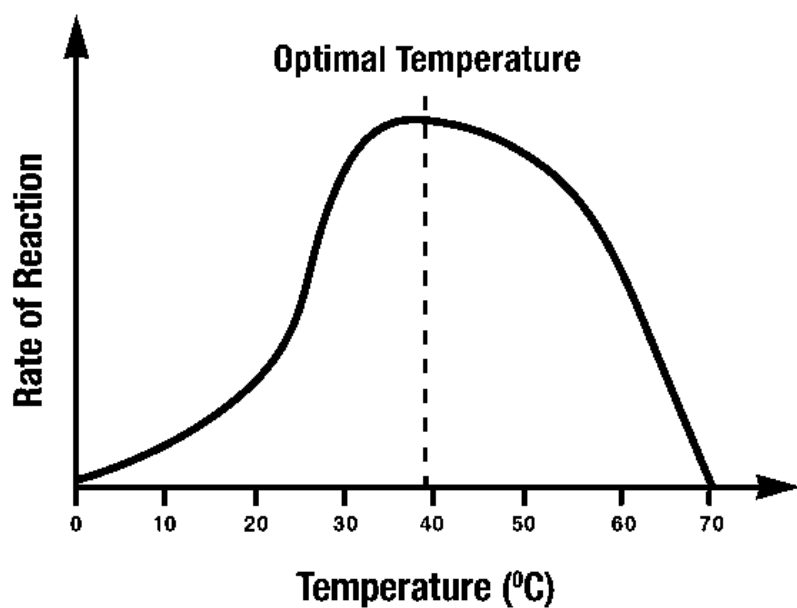
(d) State TWO importance of enzymes in living organisms. (2 marks)

i. _____

ii. _____

QUESTION 6: Factors Affecting Enzyme Activity (Graphs/Diagrams) (16 marks)

Diagram 3 shows the effect of temperature on enzyme activity.

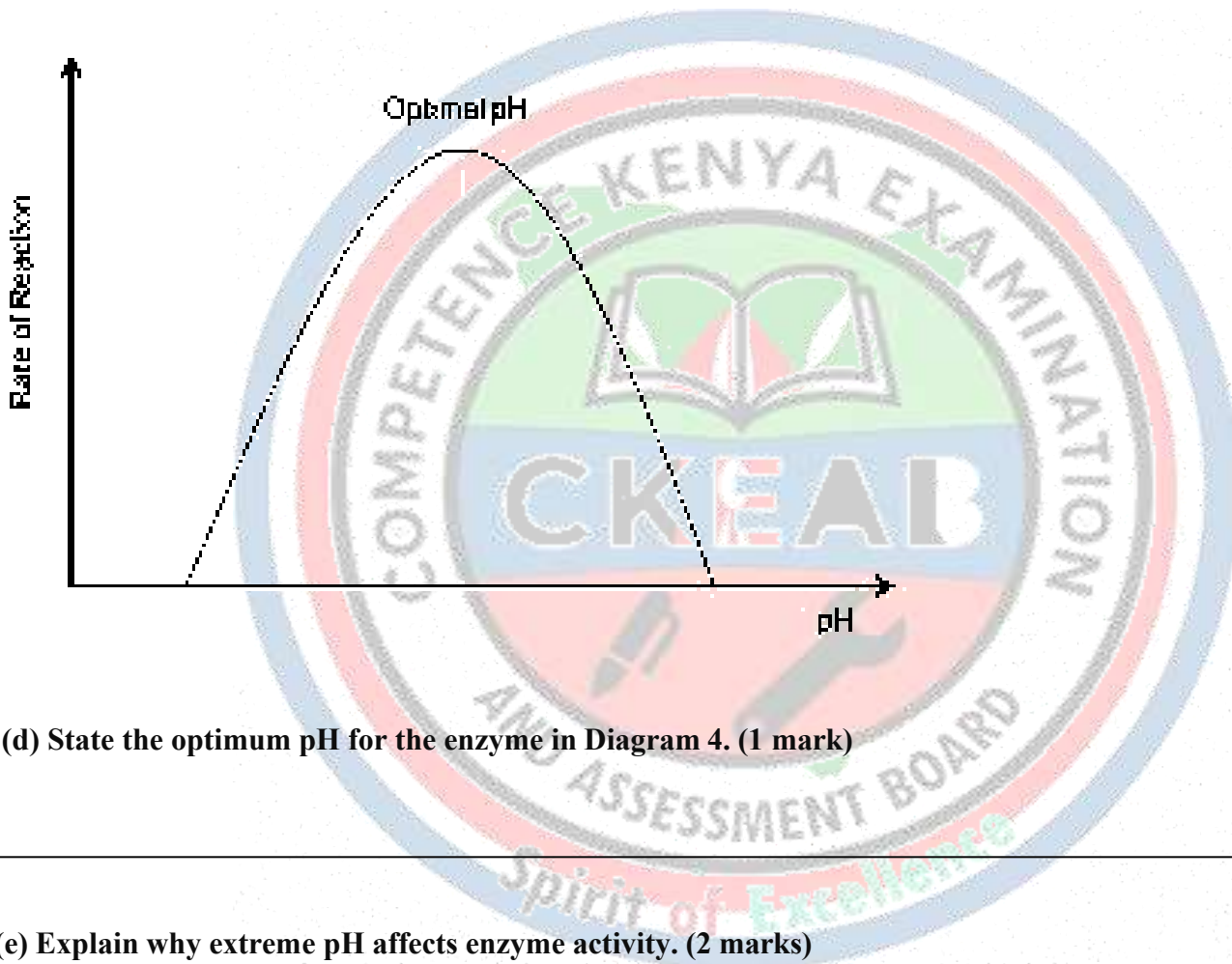


(a) From the graph, state the optimum temperature of the enzyme. (1 mark)

(b) Explain why enzyme activity increases from 20°C to 37°C. (2 marks)

(c) Explain why enzyme activity decreases after 37°C. (2 marks)

Diagram 4 shows the effect of pH on enzyme activity.



(d) State the optimum pH for the enzyme in Diagram 4. (1 mark)

(e) Explain why extreme pH affects enzyme activity. (2 marks)

(f) State FOUR other factors affecting enzyme activity apart from temperature and pH. (4 marks)

- i. _____
- ii. _____
- iii. _____
- iv. _____

(g) Explain TWO ways substrate concentration affects enzyme activity. (4 marks)

- i. _____
- ii. _____

QUESTION 7: Water, Mineral Salts and Food Labels (6 marks)

(a) State FOUR functions of water in living organisms. (4 marks)

- i. _____
- ii. _____
- iii. _____
- iv. _____

(b) State TWO functions of mineral salts in the body. (2 marks)

- i. _____
- ii. _____



STRAND 2.0: ANATOMY AND PHYSIOLOGY OF PLANTS

SUB-STRAND 2.1: NUTRITION

QUESTION 1: Types of Nutrition in Plants (22 marks)

(a) Define nutrition. (2 marks)

(b) Differentiate between autotrophic and heterotrophic nutrition. (4 marks)

(c) State TWO examples of plants that show each of the following modes of nutrition: (8 marks)

i) Parasitic

ii) Saprophytic

iii) Symbiotic

iv) Insectivorous



(d) State TWO characteristics of autotrophic plants. (4 marks)

i. _____

ii. _____

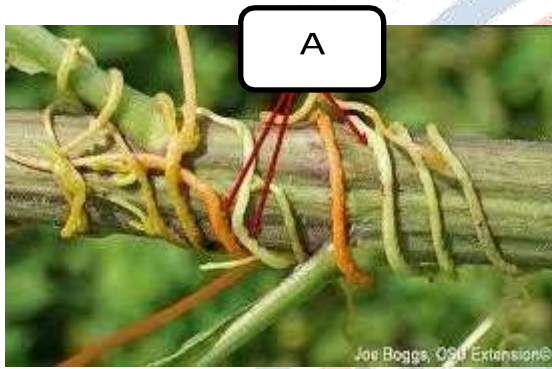
(e) Explain TWO reasons why some plants depend on heterotrophic nutrition. (4 marks)

i. _____

ii. _____

QUESTION 2: Parasitic, Saprophytic, Symbiotic and Insectivorous Nutrition (18 marks)

Diagram 1 shows a parasitic plant attached to a host plant.



(a) Name the structure labelled A. (1 mark)

(b) State the function of structure A. (2 marks)

(c) State TWO effects of parasitic plants on the host plant. (4 marks)

i. _____

ii. _____

Diagram 2 shows an insectivorous plant trapping an insect.



(d) Name the plant shown in Diagram 2 . (1 mark)

(e) Explain why insectivorous plants trap insects. (2 marks)

i. _____

ii. _____

(f) State TWO adaptations of insectivorous plants for trapping insects. (4 marks)

i. _____

ii. _____

(g) Explain symbiotic nutrition using an example. (4 marks)

i. _____

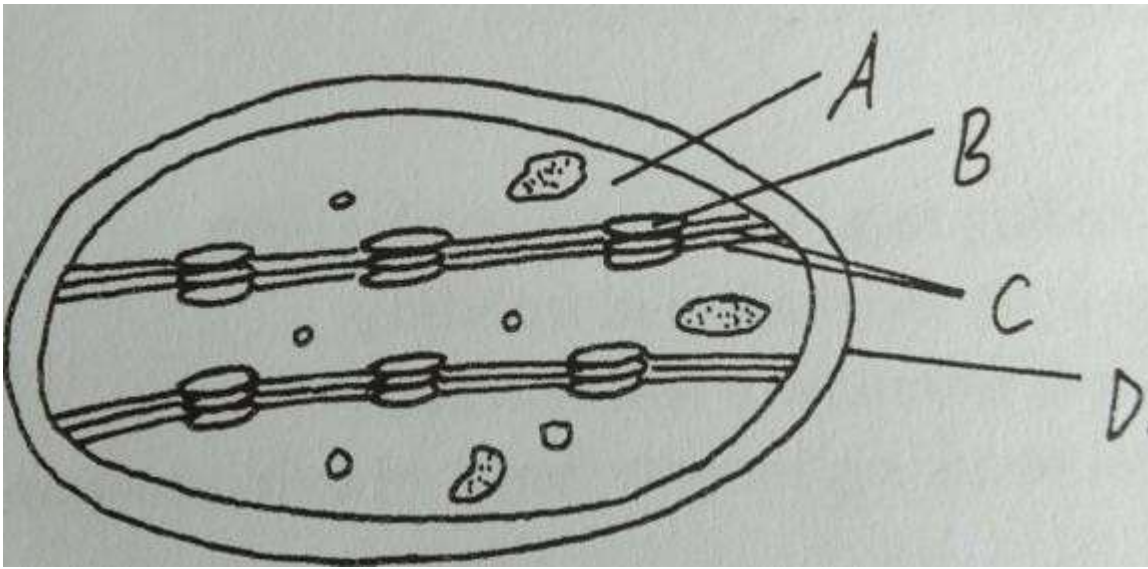
ii. _____

iii. _____

iv. _____

QUESTION 3: Structure of the Chloroplast (Diagram) (20 marks)

Diagram 3 shows the structure of a chloroplast.



(a) Name the parts labelled A–D. (4 marks)

- A. _____
- B. _____
- C. _____
- D. _____

(b) State the function of each of the following parts: (8 marks)

i) Grana (4 marks)

ii) Stroma (4 marks)

(c) Explain how the structure of the chloroplast is adapted for photosynthesis. (8 marks)

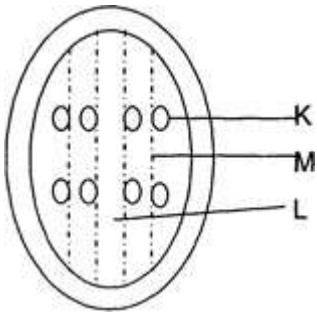
i. _____

ii. _____

iii. _____

iv. _____

d) The diagram below represents a chloroplast.



a. Name the parts labeled M and L.

M- _____ (1 mark)

L- _____ (1 mark)

b. Describe the process that takes place in the structure labeled K. (3 marks)

c) State the parts in a chloroplast where (2 mks)

i. Light stage takes place

ii. Dark stage takes place

QUESTION 4: Photosynthesis (Meaning and Equation) (14 marks)

(a) Define photosynthesis. (2 marks)

(b) Write the word equation for photosynthesis. (2 marks)

(c) Write the balanced chemical equation for photosynthesis. (2 marks)

i. _____

ii. _____

(d) State FOUR requirements for photosynthesis. (4 marks)

i. _____

ii. _____

iii. _____

iv. _____

(e) State FOUR factors that affect the rate of photosynthesis. (4 marks)

i. _____

ii. _____

iii. _____

iv. _____

QUESTION 5: Light and Dark Stages of Photosynthesis (Flow Chart Diagram) (18 marks)

Diagram 4 shows a simplified flow chart of photosynthesis.

DIAGRAM 4: Photosynthesis stages

LIGHT STAGE (in grana)

Light energy + chlorophyll

|

Water splits (photolysis)

|

Oxygen released + Hydrogen formed

|

ATP + NADPH produced

|
V

DARK STAGE (in stroma)

Carbon dioxide + Hydrogen

|

Glucose formed

(a) State TWO processes that occur in the light stage. (4 marks)

- i. _____
- ii. _____

(b) State TWO products formed in the light stage that are used in the dark stage. (2 marks)

- i. _____
- ii. _____

(c) State TWO processes that occur in the dark stage. (4 marks)

- i. _____
- ii. _____

(d) State the raw materials used in the dark stage. (2 marks)

- _____
- _____

(e) Explain why the dark stage is also called the light-independent stage. (2 marks)

- i. _____
- ii. _____

(f) State TWO differences between the light stage and the dark stage. (4 marks)

- i. _____
- ii. _____

QUESTION 6: Significance of Photosynthesis (8 marks)

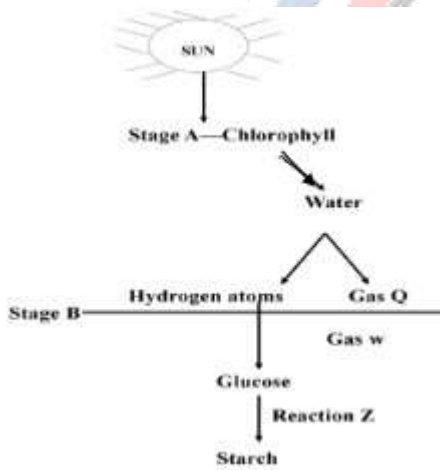
(a) State FOUR importance of photosynthesis to living organisms. (4 marks)

- i. _____
- ii. _____
- iii. _____
- iv. _____

(b) Explain TWO ways photosynthesis helps to maintain balance of gases in the atmosphere. (4 marks)

- i. _____
- ii. _____

(c) Below is a diagrammatic summary of the main biochemical events in photosynthesis. Study it carefully and answer the questions that follow.



a) Suggest the identify of molecule P. (1 mk)

b) Name the gases represented by the letters (2 mks)

Q

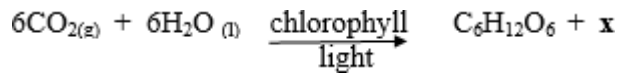
W

c) Name the specific site for the reactions in stage B (1 mk)

d) Name reaction Z. (1 mk)

Question 7

Study the following equation and answer the questions that follow:



(a) Identify x (1 mark)

(b) Name the organelle where the above process occurs (1 mark)



STRAND 2.0: ANATOMY AND PHYSIOLOGY OF PLANTS

SUB-STRAND 2.2: TRANSPORT

QUESTION 1: Plant Transport System (Roots, Stems, Leaves) (18 marks)

(a) Define transport in plants. (2 marks)

(b) State FOUR materials that are transported in plants. (4 marks)

- i. _____
- ii. _____
- iii. _____
- iv. _____

(c) Explain THREE adaptations of roots for transport of water and mineral salts. (6 marks)

- i. _____
- ii. _____
- iii. _____

(d) Explain THREE adaptations of stems for transport in plants. (6 marks)

- i. _____
- ii. _____
- iii. _____

QUESTION 2: Vascular Tissues (Xylem and Phloem) (16 marks)

(a) Name the two vascular tissues found in plants. (2 marks)

- i. _____
- ii. _____

(b) State FOUR differences between xylem and phloem. (8 marks)

Xylem	Phloem

(c) State THREE functions of xylem. (3 marks)

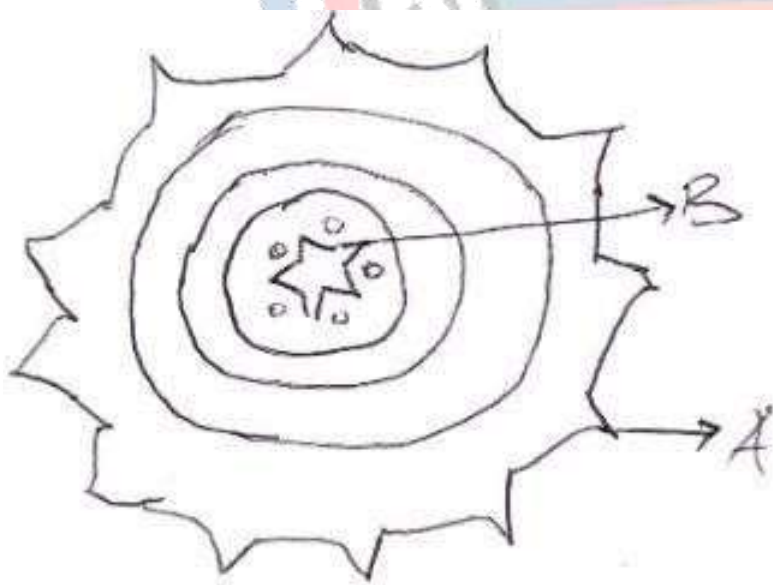
- i. _____
- ii. _____
- iii. _____

(d) State THREE functions of phloem. (3 marks)

- i. _____
- ii. _____
- iii. _____

QUESTION 3: Arrangement of Vascular Tissues in Monocots and Dicots (Diagrams) (18 marks)

The diagram below represents a cross section obtained from a plant. Use it to answer the questions that follow.



a. From which part of the plant was the section obtained from? (1 mk)

b. Give a reason for your answer in(a) above. (1 mk)

c. Name part B. (1 mk)

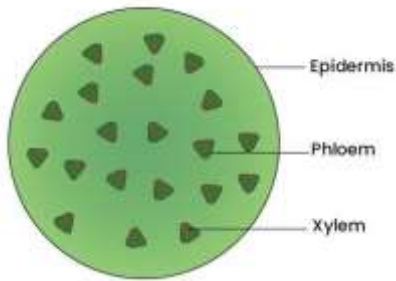
d. Name the material that strengthens the part you named in (c) above. (1 mk)

QUESTION 4:

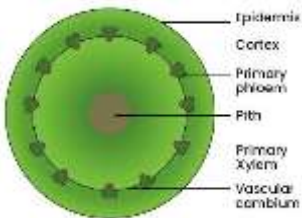
(a) State TWO differences between the arrangement of vascular bundles in monocot and dicot stems. (4 marks)

(b) Identify the type of stem shown in: (2 marks)

i) Diagram 1



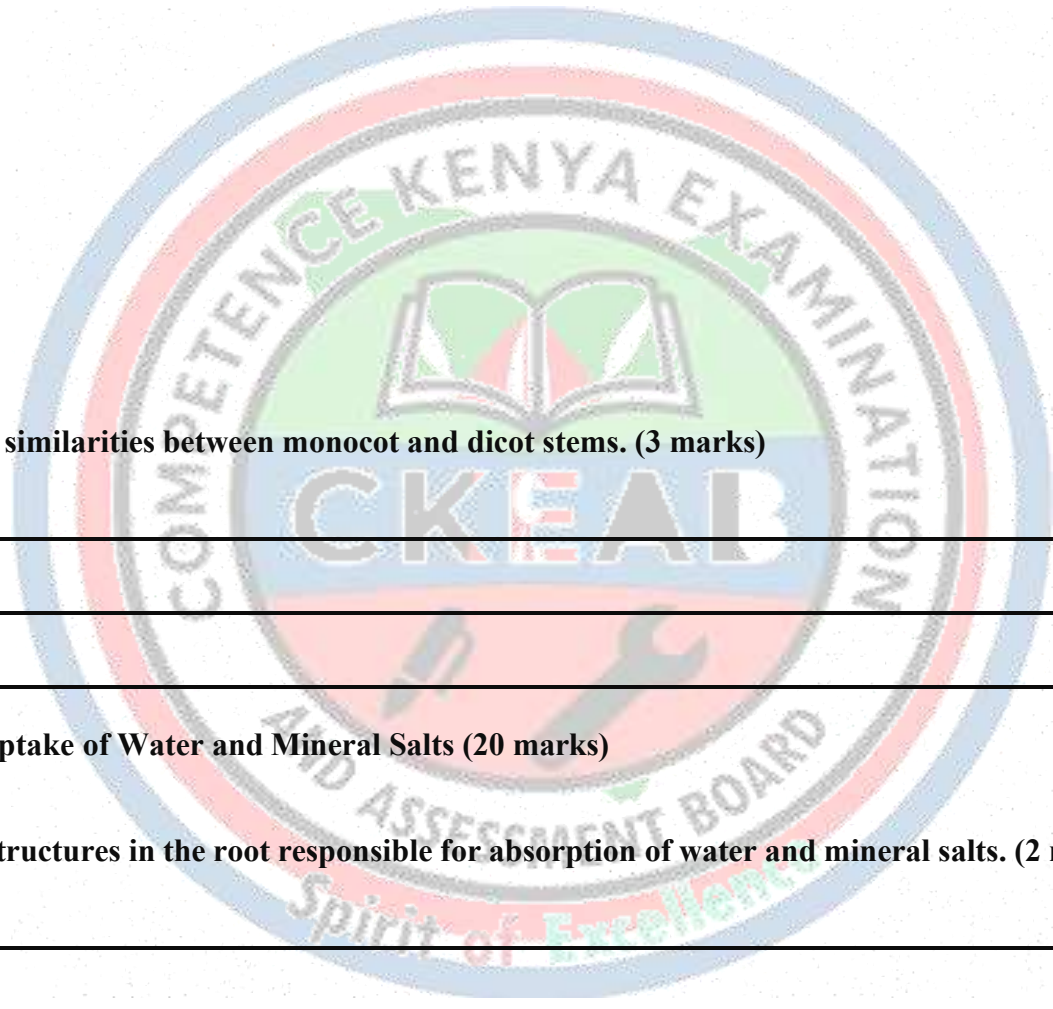
ii) Diagram 2



(c) State THREE reasons why vascular bundles are important in plants. (3 marks)

- i. _____
- ii. _____
- iii. _____

(d) Draw and label a simple diagram of a vascular bundle showing xylem and phloem. (6 marks)



(e) State THREE similarities between monocot and dicot stems. (3 marks)

- i. _____
- ii. _____
- iii. _____

QUESTION 4: Uptake of Water and Mineral Salts (20 marks)

(a) Name TWO structures in the root responsible for absorption of water and mineral salts. (2 marks)

- i. _____
- ii. _____

(b) Explain how root hair cells are adapted for absorption. (6 marks)

- i. _____
- ii. _____
- iii. _____

(c) Describe how water moves from the soil into the xylem vessels. (6 marks)

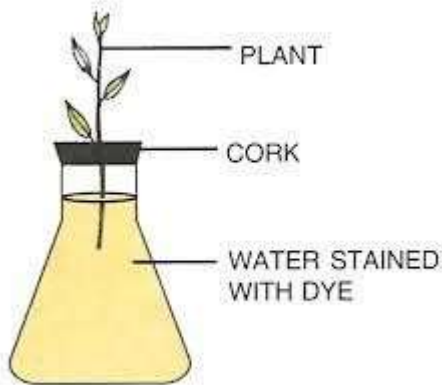
- i. _____
- ii. _____
- iii. _____

(d) Explain THREE mechanisms involved in the movement of water from roots to leaves. (6 marks)

- i. _____
- ii. _____
- iii. _____

QUESTION 5: Demonstration Experiments (Uptake of Water) (12 marks)

Diagram 3 shows an experiment using a plant shoot placed in coloured water.



(a) State the aim of the experiment. (2 marks)

- _____
- _____

(b) State TWO observations made after a few hours. (4 marks)

- i. _____
- ii. _____

(c) What conclusion can be made from the experiment? (2 marks)

(d) Name the tissue responsible for transport of the coloured water. (1 mark)

(e) State THREE precautions to take to ensure valid results. (3 marks)

i. _____

ii. _____

iii. _____

QUESTION 6: Transpiration (10 marks)

(a) Define transpiration. (2 marks)

(b) State FOUR factors that affect the rate of transpiration. (4 marks)

i. _____

ii. _____

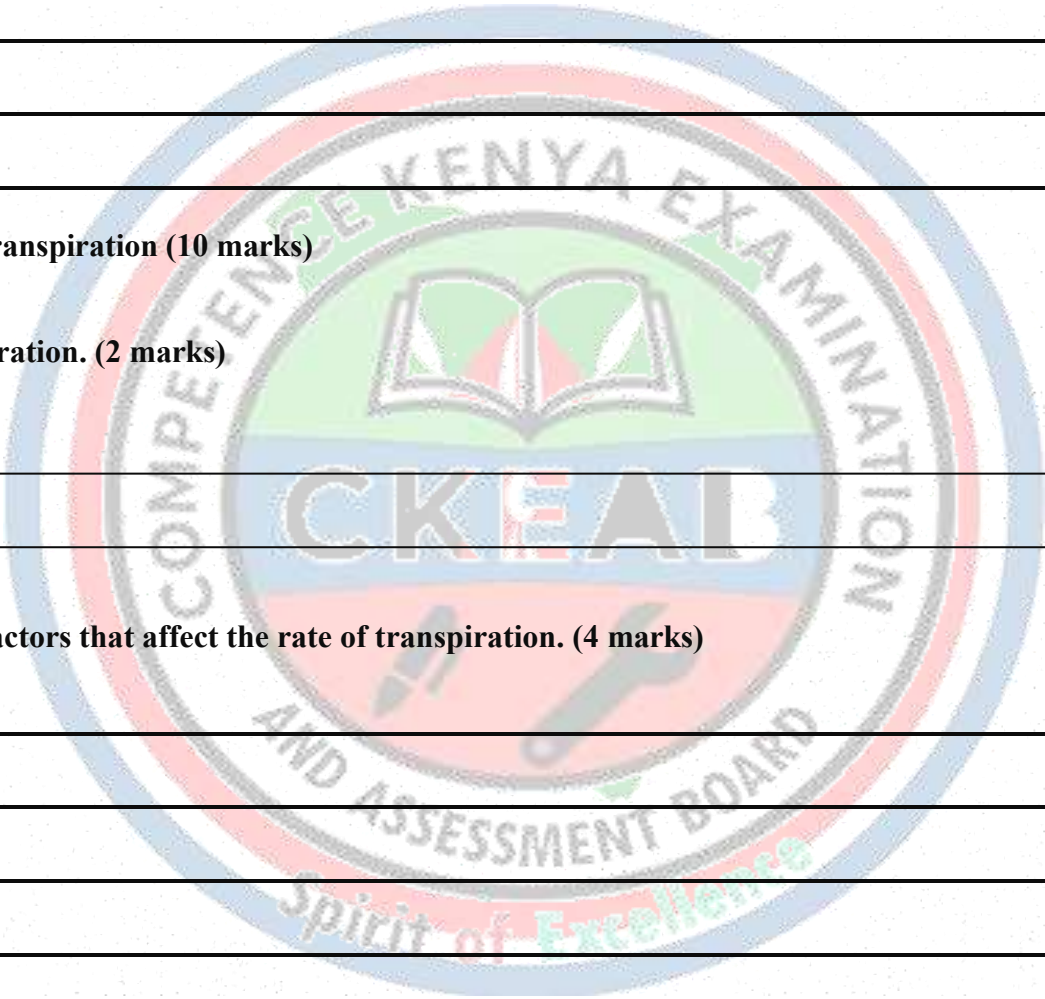
iii. _____

iv. _____

(c) Explain TWO ways plants reduce excessive transpiration. (4 marks)

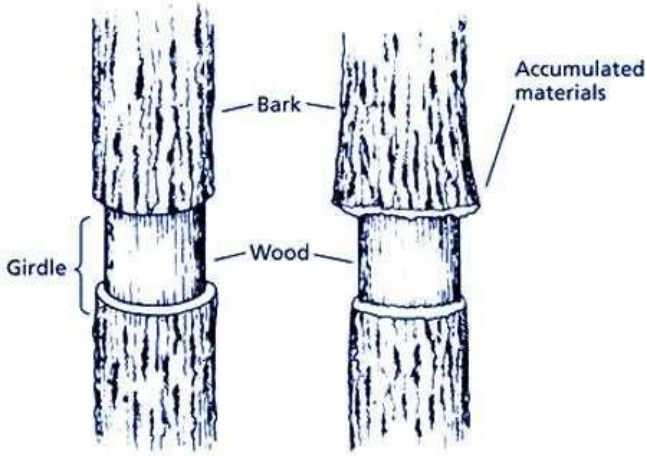
i. _____

ii. _____



QUESTION 7: Translocation of Manufactured Food (Evidence + Girdling Experiment) (6 marks)

Diagram 4 shows a girdling (ringing) experiment.



(a) State the aim of the girdling experiment. (2 marks)

(b) State what is observed above the ring after some days. (2 marks)

(c) Name the tissue responsible for translocation. (1 mark)

(d) Explain why the plant eventually dies if the bark ring is not replaced. (1 mark)

SUB-STRAND 2.3: GASEOUS EXCHANGE AND RESPIRATION

QUESTION 1: Meaning and Significance of Gaseous Exchange (12 marks)

(a) Define gaseous exchange. (2 marks)

(b) State THREE reasons why gaseous exchange is important in plants. (3 marks)

i. _____

ii. _____

iii. _____

(c) Explain THREE ways gaseous exchange benefits the environment. (6 marks)

i. _____

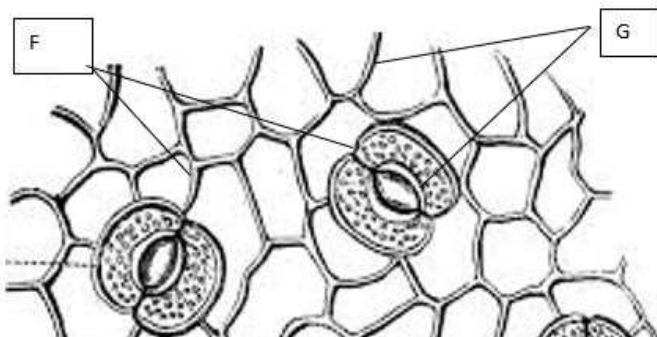
ii. _____

iii. _____

(d) Name ONE gas taken in by plants during photosynthesis. (1 mark)

QUESTION 2: Sites of Gaseous Exchange in Plants (Terrestrial and Aquatic) (20 marks)

(a) Study the diagram below and answer the questions that follow



(i) Name **two** processes carried out by the structures labelled **F** to allow the opening of the stoma. (2 marks)

(ii) State **three** characteristics of the structures labelled **G**. (3 marks)

(iii) Explain how uptake of water enables the structures labelled **F** to function. (3 marks)

(b) State **TWO** functions of stomata in plants. (2 marks)

i. _____

ii. _____

(c) Explain **FOUR** adaptations of a leaf for efficient gaseous exchange. (8 marks)

i. _____

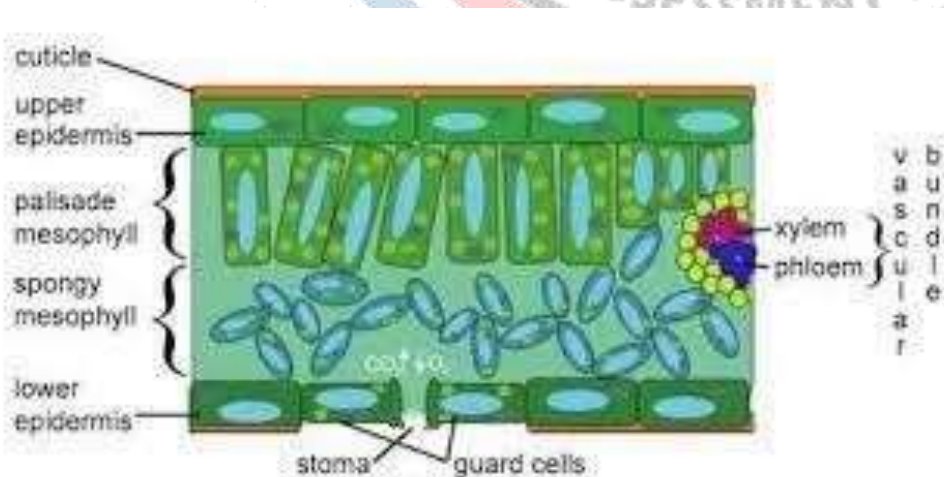
ii. _____

iii. _____

iv. _____

QUESTION 3

The diagram below shows the internal structure of a leaf obtained from a plant in a certain habitat.



a) State **two** observable adaptations of the leaf to its habitat in relation to gaseous exchange. (2 marks)

i. _____

ii. _____

b) Apart from the stoma, name other **two** sites for gaseous exchange in plants. (2 marks)

i. _____

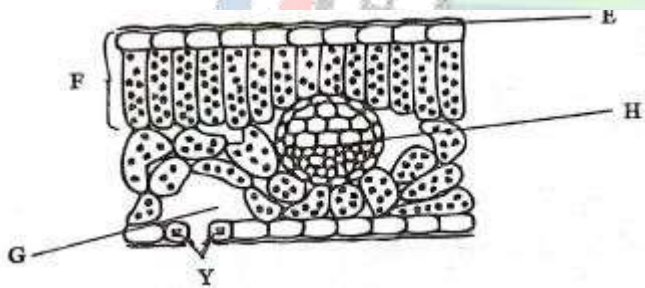
ii. _____

c) State **two** adaptations of the spongy mesophyll cells to gaseous exchange. (2 marks)

i. _____

ii. _____

(d) The diagram below shows the internal parts of a leaf.



The part labelled F is the (1mk)

e) The part labelled H is known as the _____ it contains _____ and _____ tissues. (3mks)

i. _____

ii. _____

(f) State the habitat where plants with pneumatophores are found. (1 mark)

(g) Explain THREE adaptations of pneumatophores for gaseous exchange. (6 marks)

i. _____

ii. _____

(h) State TWO other aquatic plant adaptations for gaseous exchange. (4 marks)

i. _____

ii. _____

QUESTION 4: Mechanism of Opening and Closing of Stomata (24 marks)

(a) State TWO conditions that cause stomata to open. (2 marks)

i. _____

ii. _____

(b) State TWO conditions that cause stomata to close. (2 marks)

i. _____

ii. _____

(c) Explain how guard cells open the stomata using the potassium ion theory. (8 marks)

i. _____

ii. _____

iii. _____

iv. _____

v. _____

(d) Explain the starch–sugar interconversion theory in stomatal movement. (6 marks)

i. _____

ii. _____

iii. _____

iv. _____

v. _____

(e) Explain the photosynthetic theory of stomatal opening. (6 marks)

QUESTION 5: Practical Investigation on Stomata Distribution (10 marks)

A learner collected leaves from:

- A water lily (aquatic plant)
- A maize plant (terrestrial plant)

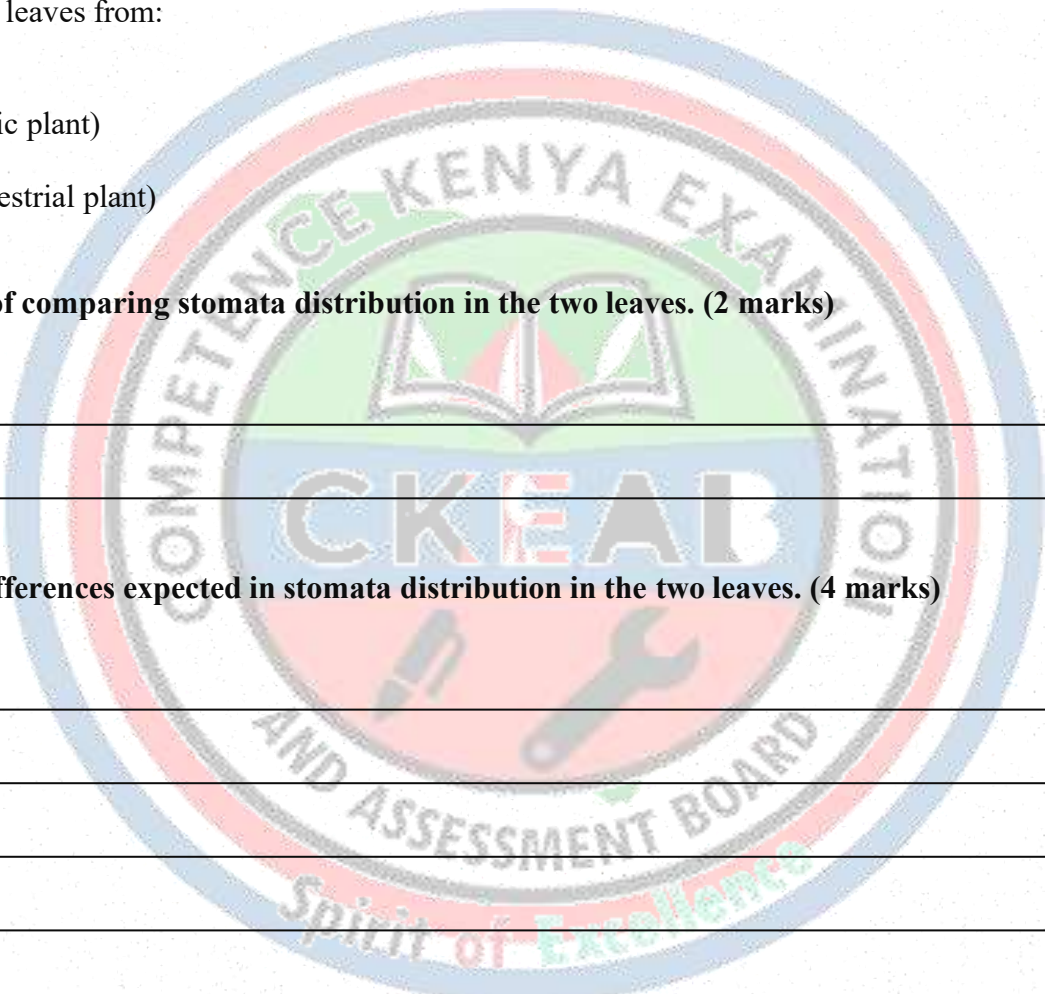
(a) State the aim of comparing stomata distribution in the two leaves. (2 marks)

(b) State TWO differences expected in stomata distribution in the two leaves. (4 marks)

(c) Give TWO reasons why stomata are fewer on the upper surface of most terrestrial leaves. (4 marks)

i. _____

ii. _____



QUESTION 6: Respiration (Types and Experiments) (20 marks)

(a) Define respiration. (2 marks)

(b) Differentiate between aerobic and anaerobic respiration. (4 marks)

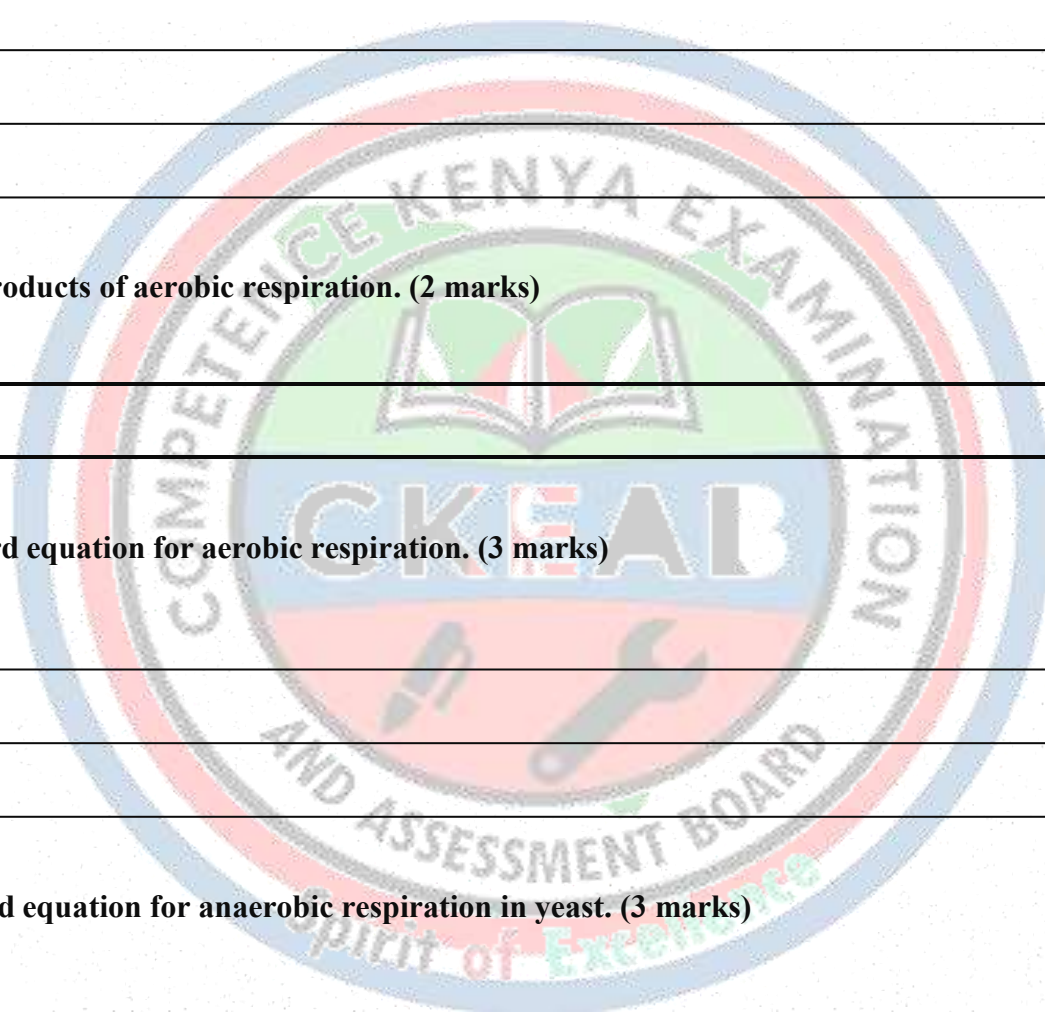
(c) State TWO products of aerobic respiration. (2 marks)

i. _____

ii. _____

(d) Write the word equation for aerobic respiration. (3 marks)

(e) Write the word equation for anaerobic respiration in yeast. (3 marks)



(f) Describe an experiment that can be used to show that respiration produces carbon dioxide. (6 marks)

- i. _____
- ii. _____
- iii. _____
- iv. _____
- v. _____
- vi. _____

QUESTION 7: Economic Importance of Anaerobic Respiration + Project (14 marks)

(a) State FOUR uses of anaerobic respiration (fermentation) in daily life. (4 marks)

- i. _____
- ii. _____
- iii. _____
- iv. _____

(b) Explain THREE ways anaerobic respiration is important in agriculture. (6 marks)

- i. _____
- ii. _____
- iii. _____

(c) A learner plans a fermentation project using locally available materials.

State FOUR items that should be included in the learner's project portfolio. (4 marks)

- i. _____
- ii. _____
- iii. _____
- iv. _____

STRAND 3.0: ANATOMY AND PHYSIOLOGY OF ANIMALS

SUB-STRAND 3.1: NUTRITION

QUESTION 1: Feeding Modes in Insects (12 marks)

(a) Define the term “feeding mode”. (2 marks)

(b) State FOUR feeding modes found in insects. (4 marks)

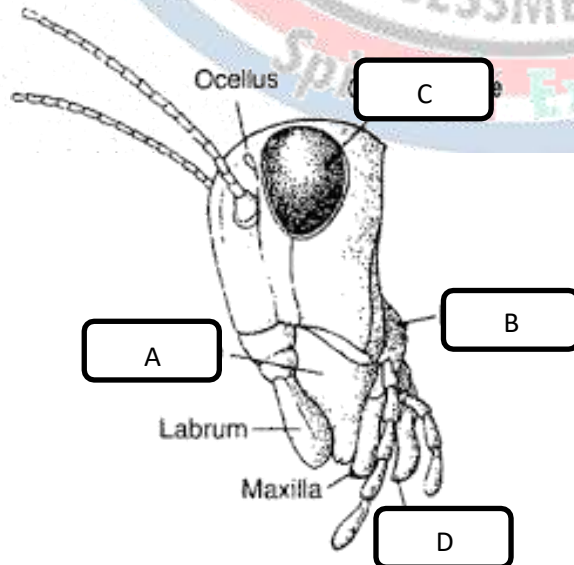
- i. _____
- ii. _____
- iii. _____
- iv. _____

(c) Explain THREE reasons why insects have different mouthparts. (6 marks)

- i. _____
- ii. _____
- iii. _____

QUESTION 2: Mouthparts of a Grasshopper/Locust (Biting and Chewing) (20 marks)

Diagram 1 shows the mouthparts of a grasshopper (biting and chewing insect).



(a) Name the parts labelled A, B, C and D. (4 marks)

A. _____

B _____

C. _____

D _____

(b) State the function of each of the parts labelled: (8 marks)

A: _____ (2 marks)

B: _____ (2 marks)

C: _____ (2 marks)

D: _____ (2 marks)

(c) Explain how the grasshopper mouthparts are adapted for feeding on leaves. (6 marks)

i. _____

ii. _____

iii. _____

iv. _____

(d) Give ONE example of another insect with biting and chewing mouthparts. (2 marks)

QUESTION 3: Piercing and Sucking Mouthparts (Mosquito) (18 marks)

Diagram 2 shows the mouthparts of a mosquito.

DIAGRAM 2: Mosquito mouthparts (piercing and sucking)



(a) State the function of. (1 mark)

Proboscis

_____.

Stylets

_____.

(b) State TWO functions of the stylets labelled B. (4 marks)

i. _____

ii. _____

(c) Explain THREE adaptations of the mosquito mouthparts for feeding. (6 marks)

i. _____

ii. _____

iii. _____

(d) State TWO diseases transmitted by mosquitoes. (2 marks)

i. _____

ii. _____

(e) Give TWO examples of insects with piercing and sucking mouthparts. (2 marks)

i. _____

ii. _____

(f) State THREE precautions humans can take to prevent mosquito bites. (3 marks)

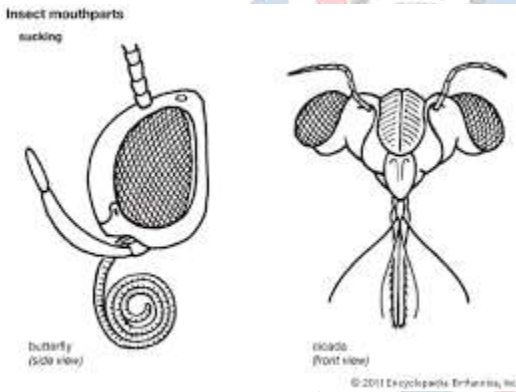
i. _____

ii. _____

iii. _____

QUESTION 4: Siphoning Mouthparts (Butterfly/Moth) (10 marks)

Diagram 3 shows the mouthparts of a butterfly.



(a) Name the mouthpart shown in Diagram 3. (2 marks)

i. _____

ii. _____

iii. _____

(b) State the type of feeding mode shown. (2 marks)

(c) Explain THREE adaptations of this mouthpart for feeding. (6 marks)

- i. _____
- ii. _____
- iii. _____

QUESTION 5: Cutting and Sponging/Cutting Mouthparts (Tsetse Fly) (10 marks)

(a) State the feeding mode of the tsetse fly. (2 marks)

(b) Explain how its mouthparts are adapted for feeding. (6 marks)

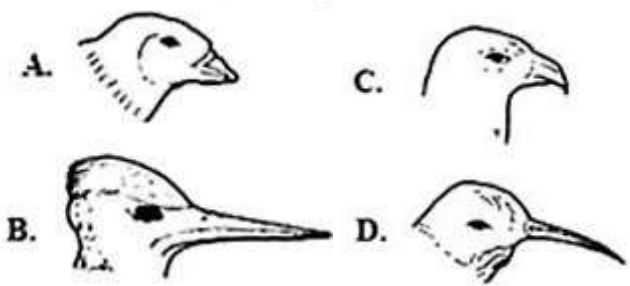
- i. _____
- ii. _____
- iii. _____

(c) State ONE disease transmitted by tsetse fly. (2 marks)

SECTION B: BIRD BEAKS (20 MARKS)

QUESTION 6: Bird Beaks and Feeding Adaptations (20 marks)

Diagram 5 shows different types of bird beaks.



(a) Identify the feeding type of each beak . (4 marks)

- i. _____
- ii. _____
- iii. _____
- iv. _____

(b) Explain two adaptation of each beak to its feeding mode. (6 marks)

Flesh eater

- i. _____
- ii. _____

Filter feeders

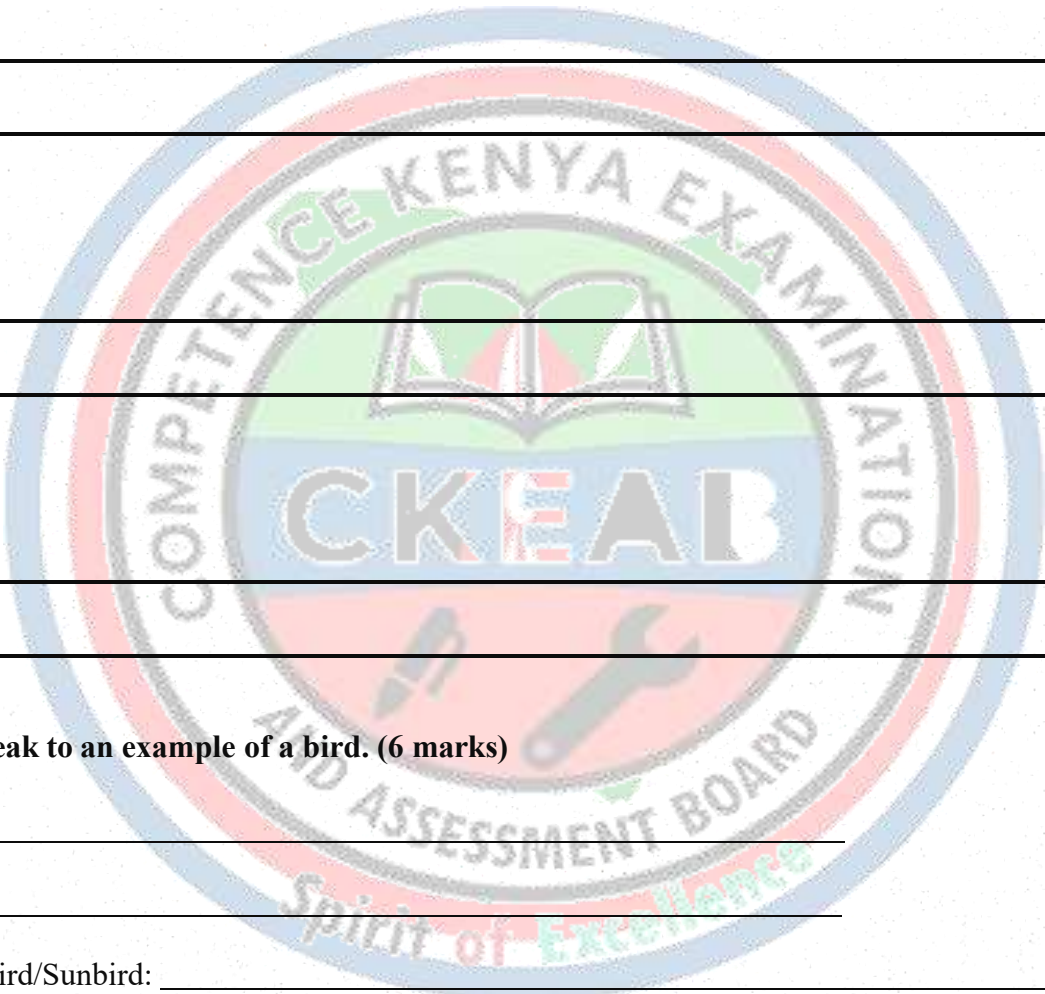
- i. _____
- ii. _____

Nectar feeder

- i. _____
- ii. _____

(c) Match each beak to an example of a bird. (6 marks)

- (a) Eagle: _____
- (b) Duck: _____
- (c) Hummingbird/Sunbird: _____
- (d) Woodpecker: _____
- (e) Weaver bird: _____
- (f) Kingfisher; _____



(d) State TWO reasons why birds show different beak shapes. (2 marks)

i. _____

ii. _____



SUB-STRAND 3.2: TRANSPORT

QUESTION 1: Importance of Transport in Animals (10 marks)

(a) Define transport in animals. (2 marks)

(b) State FOUR substances transported in animals. (4 marks)

i. _____

ii. _____

iii. _____

iv. _____

(c) Explain FOUR importance of transport in animals. (4 marks)

i. _____

ii. _____

iii. _____

iv. _____

QUESTION 2: Types of Circulatory Systems (12 marks)

(a) Distinguish between: (4 marks)

(i) Open and closed circulatory systems (2 marks)

(ii) Single and double circulatory systems (2 marks)

(b) Give ONE example of an animal with: (4 marks)

(i) open circulation: _____

(ii) closed circulation: _____

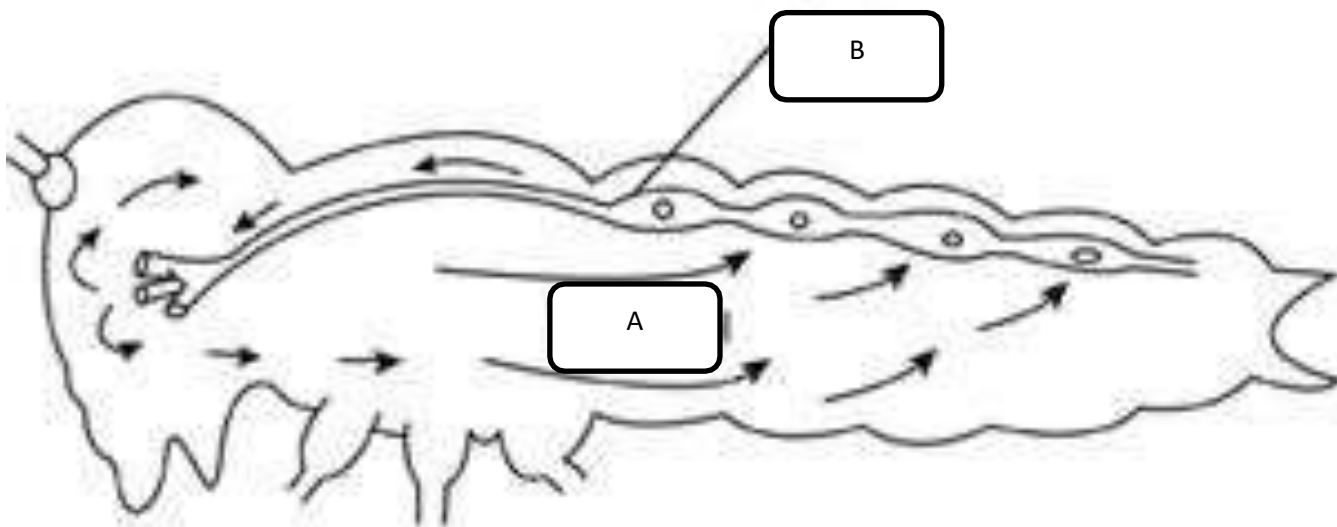
(iii) single circulation: _____

(iv) double circulation: _____

(c) State FOUR advantages of a closed circulatory system. (4 marks)

QUESTION 3: Transport System in Insects (12 marks)

Diagram 1 shows a simplified transport system in an insect.



(a) Name the parts labelled A, B and C. (2 marks)

A _____

B: _____

(b) State the type of circulatory system in insects. (1 mark)

(c) Explain how transport occurs in insects. (4 marks)

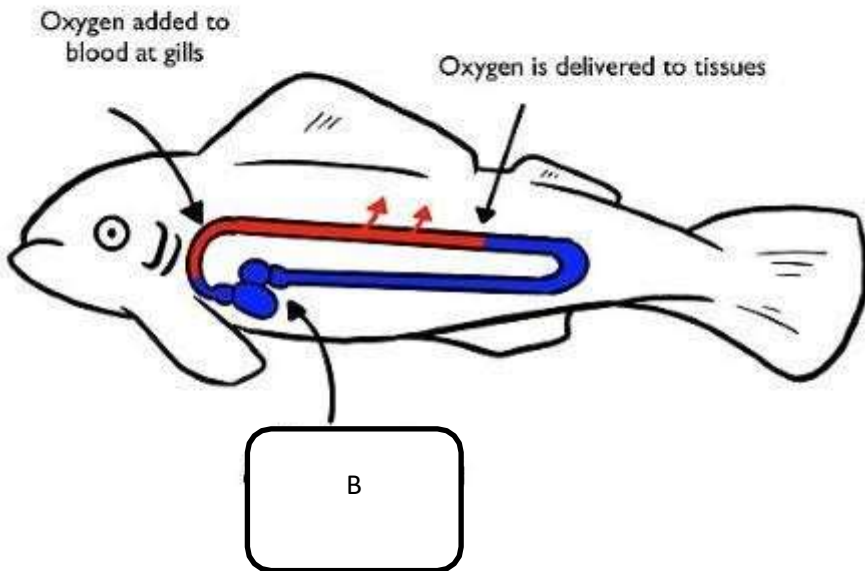
(d) State TWO reasons why insects do not use blood to transport oxygen. (4 marks)

i. _____

ii. _____

QUESTION 4: Transport System in Fish (Single Circulation) (12 marks)

Diagram 2 shows blood circulation in a fish.



(a) State the type of circulation in fish. (2 marks)

(b) Name the structure labelled B. (1 mark)

(c) Explain why fish circulation is called single circulation. (3 marks)

(d) State THREE advantages of gills in transport. (3 marks)

i.

ii.

iii.

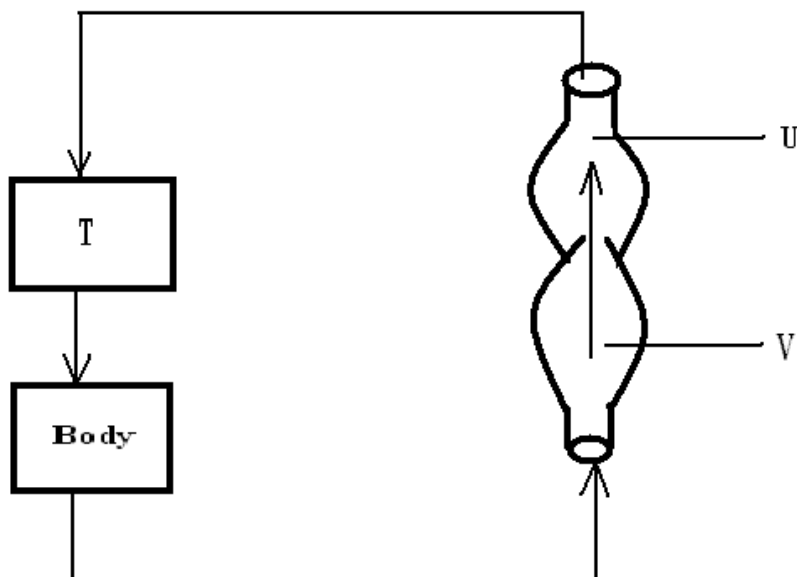
(e) State THREE limitations of single circulation in fish. (3 marks)

i.

ii.

iii.

f) The diagram below shows single circulation in a fish.



a. Name the parts labeled T, U and V. (3 marks)

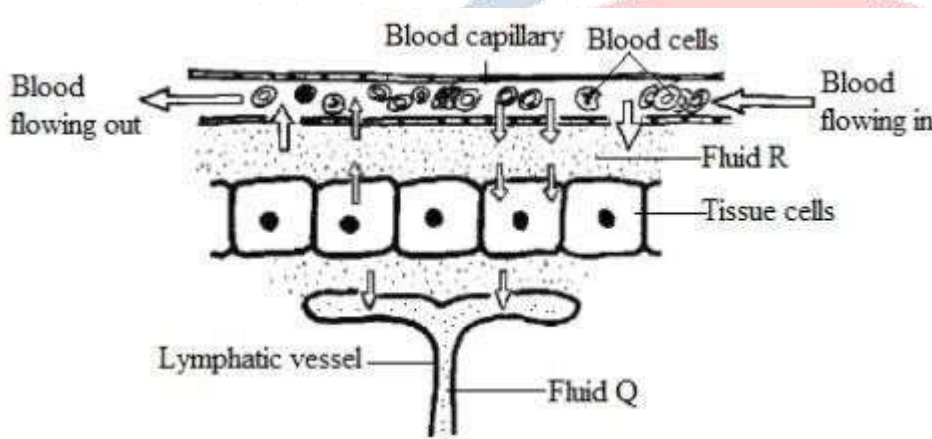
T: _____ -

U: _____

V: _____

b. How is the type of circulation different from that found in man. (1 mark)

g) The diagram below illustrates a section of circulatory system. Study it



a. Name the process that leads to formation of the fluid labeled **R** (1 mark)

b. Describe how the process named in (a) above occurs (3 marks)

c. Name one blood cell that is present in fluid **R** (1 mark)

d. Give two adaptations of capillaries to the process named in (a) above (2 marks)

e. Identify fluid labeled **Q** (1 mark)

QUESTION 5: Double Circulation in Amphibians, Reptiles and Mammals (14 marks)

(a) State the number of heart chambers in amphibians. (1 mark)

(b) Explain why amphibian circulation is described as “double but incomplete”. (4 marks)

(c) State TWO differences between amphibian and mammalian circulation. (4 marks)

i. _____

ii. _____

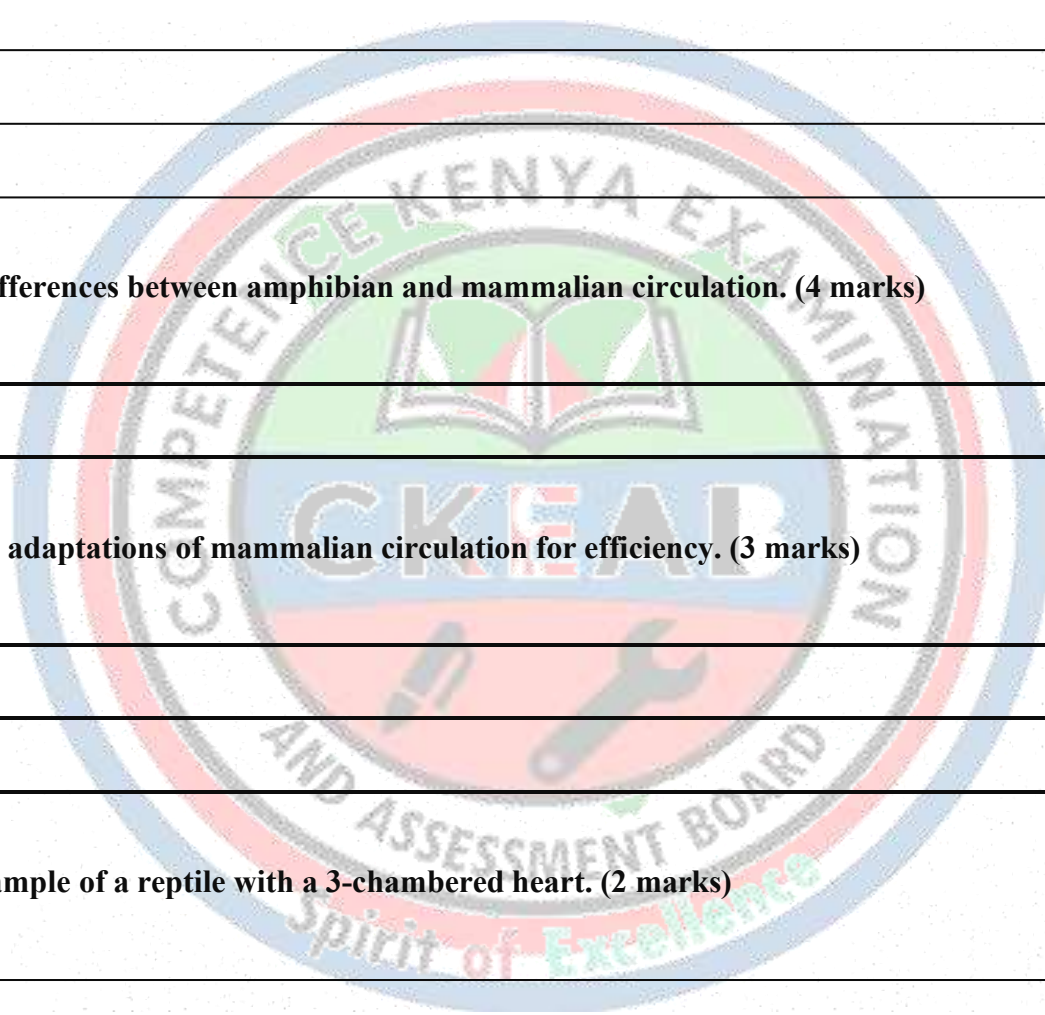
(d) State THREE adaptations of mammalian circulation for efficiency. (3 marks)

i. _____

ii. _____

iii. _____

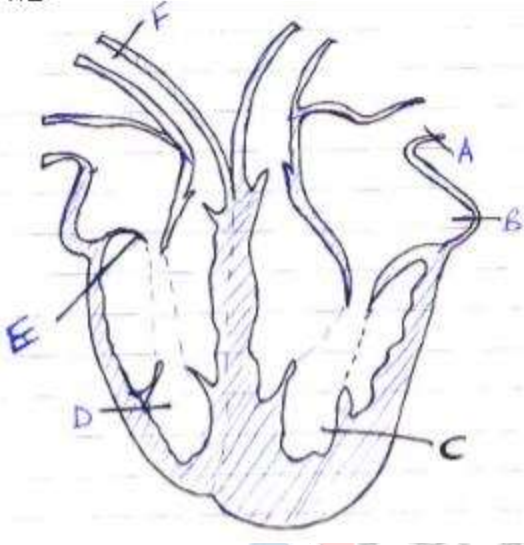
(e) Give ONE example of a reptile with a 3-chambered heart. (2 marks)



QUESTION 6: Structure of the Mammalian Heart (10 marks)

Diagram 4 shows the mammalian heart.

The diagram below shows a vertical section through a mammalian heart.



(a) Name the parts labelled A, B, E and F. (4 marks)

(b) State TWO functions of valves in the heart. (2 marks)

i.

ii.

(c) Name the chamber that pumps blood to the whole body. (1 mark)

(d) Explain why the left ventricle has thicker walls than the right ventricle. (4 marks)

e) Use arrows to show the direction in which blood flows in the heart (2 mks)

QUESTION 7: Pumping Mechanism of the Mammalian Heart (10 marks)

(a) Define the term cardiac cycle. (2 marks)

(b) Arrange the following stages in the correct order: (3 marks)

- (a) Ventricular systole
- (b) Atrial systole
- (c) Diastole

(c) Describe what happens during ventricular systole. (5 marks)

i. _____

ii. _____

iii. _____

iv. _____

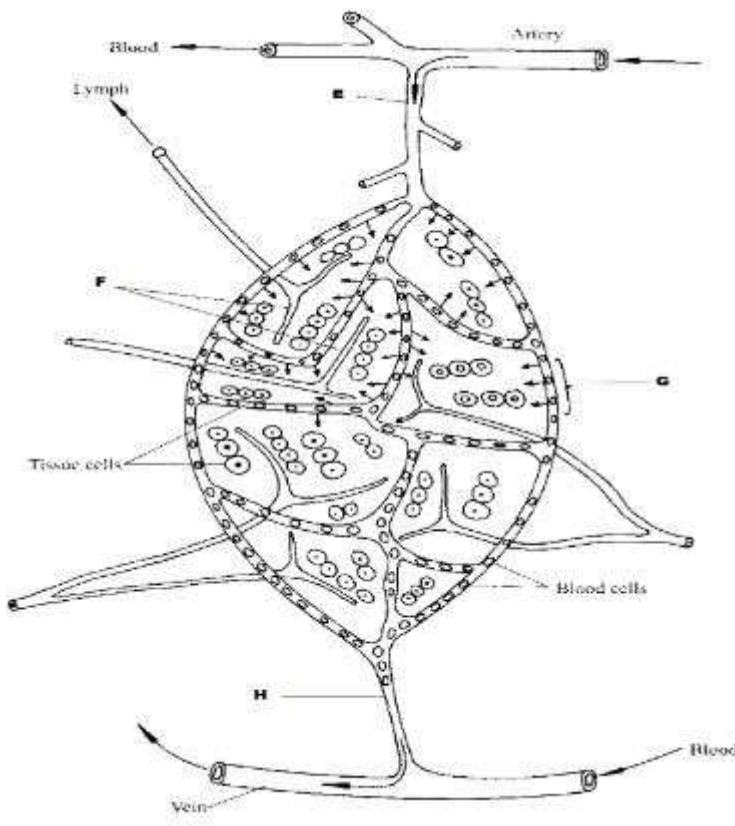
v. _____

vi. _____

QUESTION 8: Human Lymphatic and Immune Systems (10 marks)

Diagram 5 shows part of the lymphatic system.

Study the diagram below and answer questions that follow.



(a) Name parts E, F and H. (3 marks)

(b) State THREE functions of the lymphatic system. (3 marks)

i.

ii.

iii.

(c) Explain TWO ways the lymphatic system helps in immunity. (4 marks)

i.

ii.

d) State the importance of the process represented by G in bodies of living organisms. (2 marks)

i. _____

ii. _____

QUESTION 9: Blood Clotting Mechanism in Humans (10 marks)

(a) Define blood clotting. (2 marks)

(b) State FOUR importance of blood clotting. (4 marks)

i. _____

ii. _____

iii. _____

iv. _____

(c) Arrange the following in correct order during clotting: (4 marks)

- i. Fibrin
- ii. Thrombin
- iii. Prothrombin
- iv. Platelets

SECTION B: BLOOD GROUPING (ABO + RHESUS) (10 MARKS)

QUESTION 10: ABO and Rhesus Blood Grouping Systems (10 marks)

(a) State the FOUR main ABO blood groups. (2 marks)

i. _____

ii. _____

iii. _____

iv. _____

(b) State the antibodies and antigens found in: (4 marks)

(i) Blood group A (2 marks)

(ii) Blood group B (2 marks)

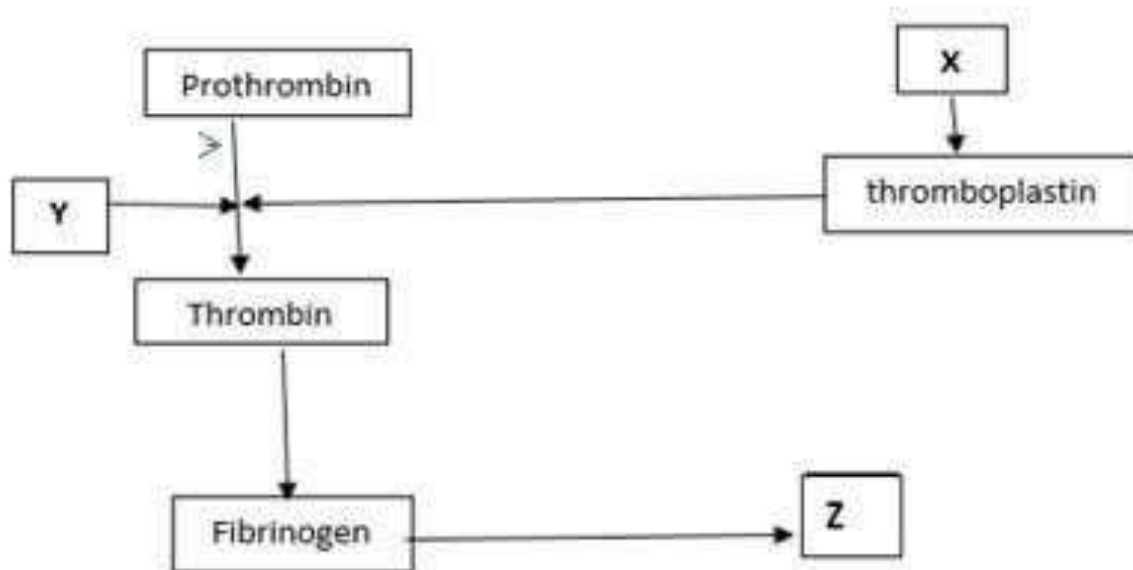
(c) State TWO possible dangers of giving wrong blood during transfusion. (2 marks)

i. _____

ii. _____

(d) Explain the meaning of Rh positive and Rh negative. (2 marks)

11. Study the flow chart below which represents a physiological process in mammals

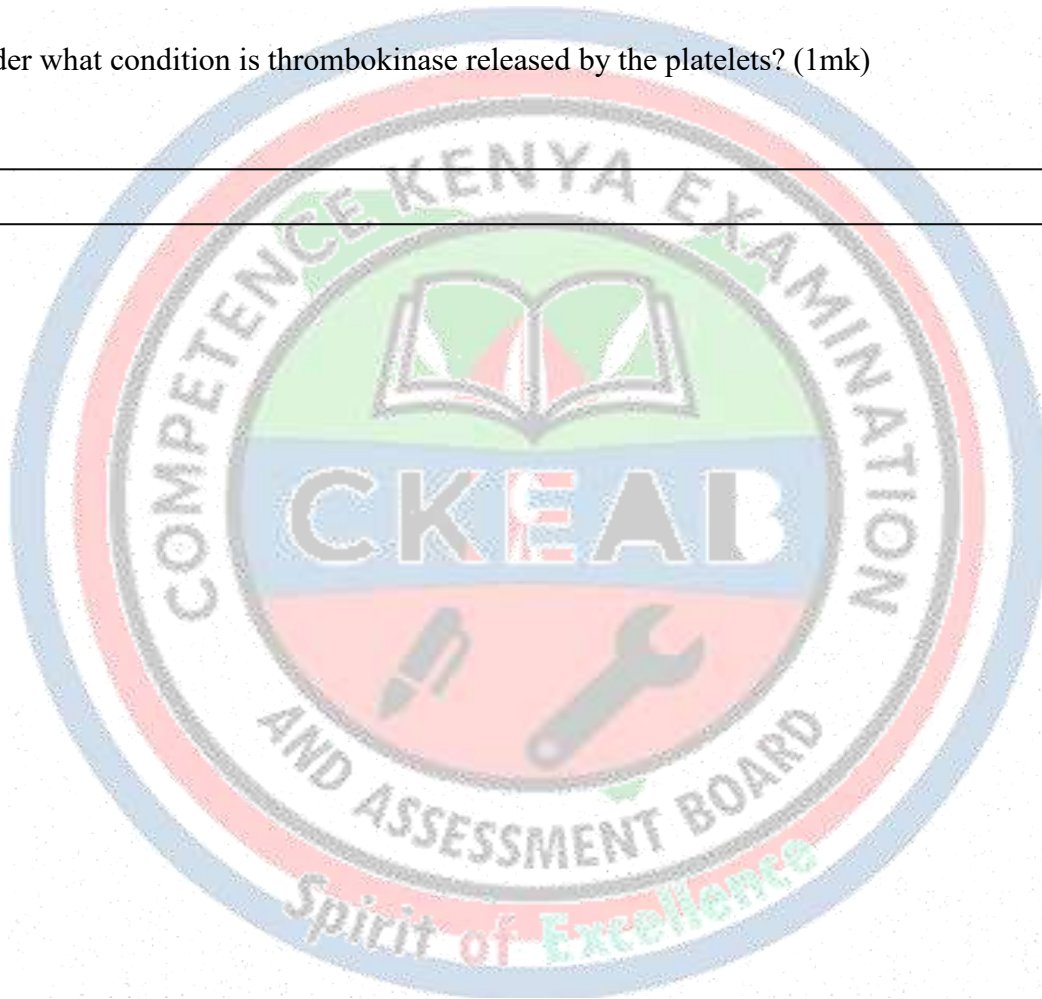


a.

i. Name blood components represented by X (1mk)

ii. What is the significance of product represented by Z (2mks)

b. Under what condition is thrombokinase released by the platelets? (1mk)



SUB-STRAND 3.3: GASEOUS EXCHANGE AND RESPIRATION

QUESTION 1: Respiratory Surfaces in Animals (10 marks)

(a) Define the term gaseous exchange. (2 marks)

(b) State FOUR characteristics of a good respiratory surface. (4 marks)

- i. _____
- ii. _____
- iii. _____
- iv. _____

(c) Explain TWO reasons why respiratory surfaces must be moist. (4 marks)

- i. _____
- ii. _____

QUESTION 2: Respiratory Structures in Different Animals (12 marks)

(a) Name the main respiratory structures used by the following animals: (5 marks)

- (i) Insects: _____
- (ii) Fish: _____
- (iii) Amphibians: _____
- (iv) Birds: _____
- (v) Mammals: _____

(b) State the adaptation of each respiratory structure named in (a). (5 marks)

- i. _____
- ii. _____
- iii. _____

iv. _____

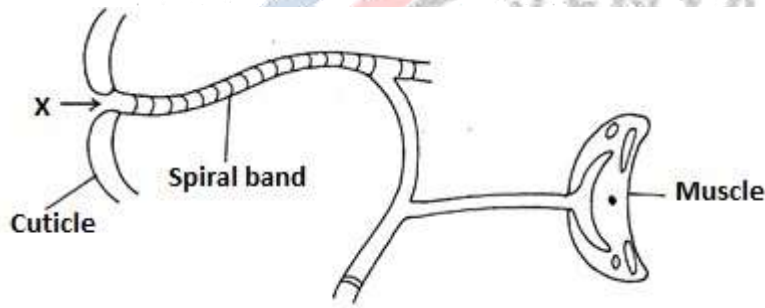
v. _____

(c) State TWO differences between gaseous exchange in fish and insects. (2 marks)

QUESTION 3: Gaseous Exchange in Insects (Tracheal System) (12 marks)

Diagram 1 shows a simplified insect tracheal system.

a) The diagram below shows the tracheal system of an insect.



1. Name structure X (1mk)

2. State the role of the spiral band on the trachea. (1mk)

3. How is ventilation maintained in the tracheal system? (1mk)

(b) State TWO adaptations of the tracheal system for efficient gaseous exchange. (4 marks)

i. _____

ii. _____

(c) Explain how oxygen reaches body cells in insects. (3 marks)

- i. _____
- ii. _____
- iii. _____
- iv. _____

(d) State TWO ways insects reduce water loss through spiracles. (2 marks)

- i. _____
- ii. _____

QUESTION 4: Gaseous Exchange in Fish (Gills) (12 marks)

Diagram 2 shows part of a bony fish gill.

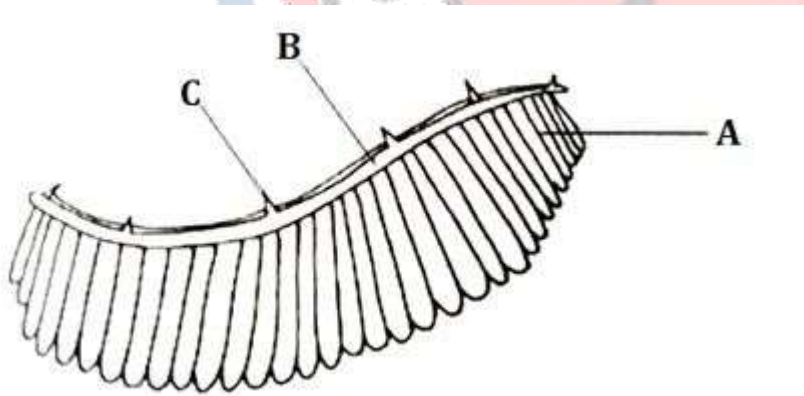
Question 5

(a) Name the gaseous exchange structure in the following organisms

(i) Amoeba _____ (1mk)

(ii) Grasshopper _____ (1mk)

(b) The diagram below illustrates the structure of a gill from a bony fish



(i) Name the parts labeled A, B, and C (3mks)

A: _____

B: _____

C: _____

(ii) State the function of the part labeled C (1mk)

(iii) How is part A adapted to carry out its functions (2mk)

(a) Name the structures labelled A and B. (2 marks)

i. _____

ii. _____

(b) State THREE adaptations of fish gills for gaseous exchange. (6 marks)

i. _____

ii. _____

iii. _____

(c) Explain the meaning of counter-current flow in fish gills. (4 marks)

QUESTION 5: Gaseous Exchange in Amphibians (10 marks)

(a) State THREE respiratory surfaces used by amphibians. (3 marks)

i. _____

ii. _____

iii. _____

(b) Explain TWO adaptations of amphibian skin for gaseous exchange. (4 marks)

i. _____

ii. _____

(c) State THREE conditions under which an amphibian uses lungs more than skin. (3 marks)

i. _____

ii. _____

iii. _____

QUESTION 6: Gaseous Exchange in Birds and Mammals (10 marks)

(a) State TWO adaptations of bird lungs that make them efficient. (4 marks)

i. _____

ii. _____

(b) State TWO differences between bird and mammalian lungs. (4 marks)

i. _____

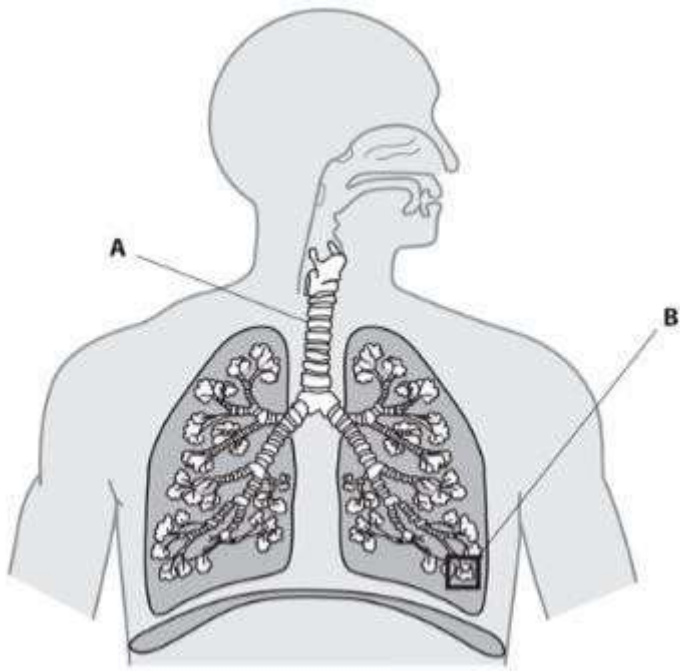
ii. _____

(c) Explain ONE reason why birds need a very efficient respiratory system. (2 marks)

QUESTION 7: Human Respiratory System (Structure) (12 marks)

Diagram 3 shows the human respiratory system.

a) The diagram shows some structures in the human breathing system. (2 marks)



a. Name structures A and B. (2 marks)

A: _____

B: _____

b. The table shows the level of two gases, X and Y, in blood entering and leaving the lungs during the process of gas exchange.

Gas	Level of gas in cm ³ per 100 cm ³ of blood	
	Blood entering lungs	Blood leaving lungs
X	10.6	19.0
Y	58.0	50.0

Name the two gases. (1 mark)

1. Gas X: _____

2. Gas Y: _____

(b) State FOUR functions of the human respiratory system. (4 marks)

i. _____

ii. _____

iii. _____

iv. _____

(c) Describe THREE adaptations of alveoli for efficient gaseous exchange. (6 marks)

- i. _____
- ii. _____
- iii. _____

(d) State ONE disease that affects the lungs. (1 mark)

QUESTION 8: Mechanism of Breathing in Humans (10 marks)

(a) Define inhalation and exhalation. (2 marks)

(b) State TWO changes that occur during inhalation. (4 marks)

- i. _____
- ii. _____

(c) State TWO changes that occur during exhalation. (4 marks)

- i. _____
- ii. _____

QUESTION 9: Aerobic and Anaerobic Respiration (12 marks)

(a) Define respiration. (2 marks)

(b) State TWO differences between aerobic and anaerobic respiration. (4 marks)

i. _____

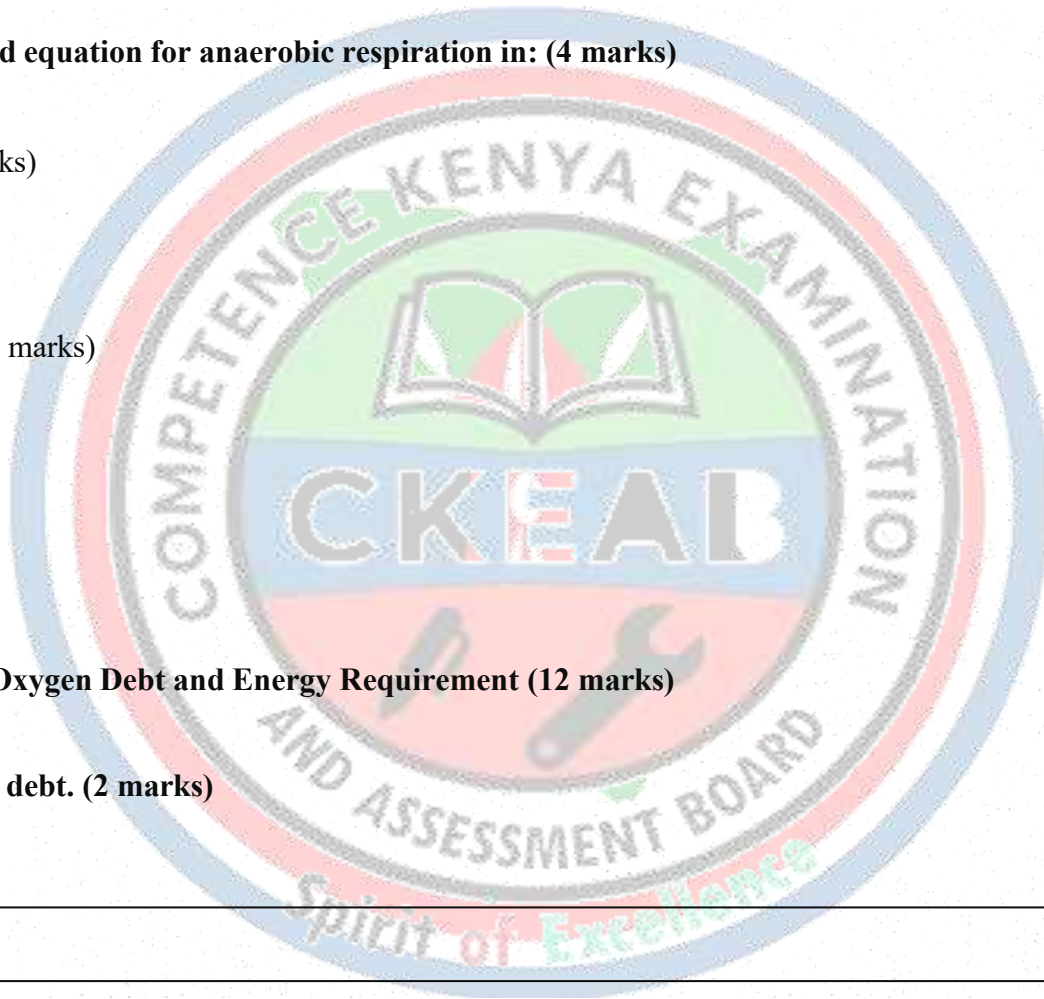
ii. _____

(c) Write the word equation for aerobic respiration. (2 marks)

(d) Write the word equation for anaerobic respiration in: (4 marks)

(i) Animals (2 marks)

(ii) Yeast/plants (2 marks)



QUESTION 10: Oxygen Debt and Energy Requirement (12 marks)

(a) Define oxygen debt. (2 marks)

(b) State THREE causes of oxygen debt during vigorous exercise. (3 marks)

i. _____

ii. _____

iii. _____

(c) Explain **THREE** ways the body repays oxygen debt. (6 marks)

i. _____

ii. _____

iii. _____

(d) State **ONE** sign that a person has oxygen debt after exercise. (1 mark)

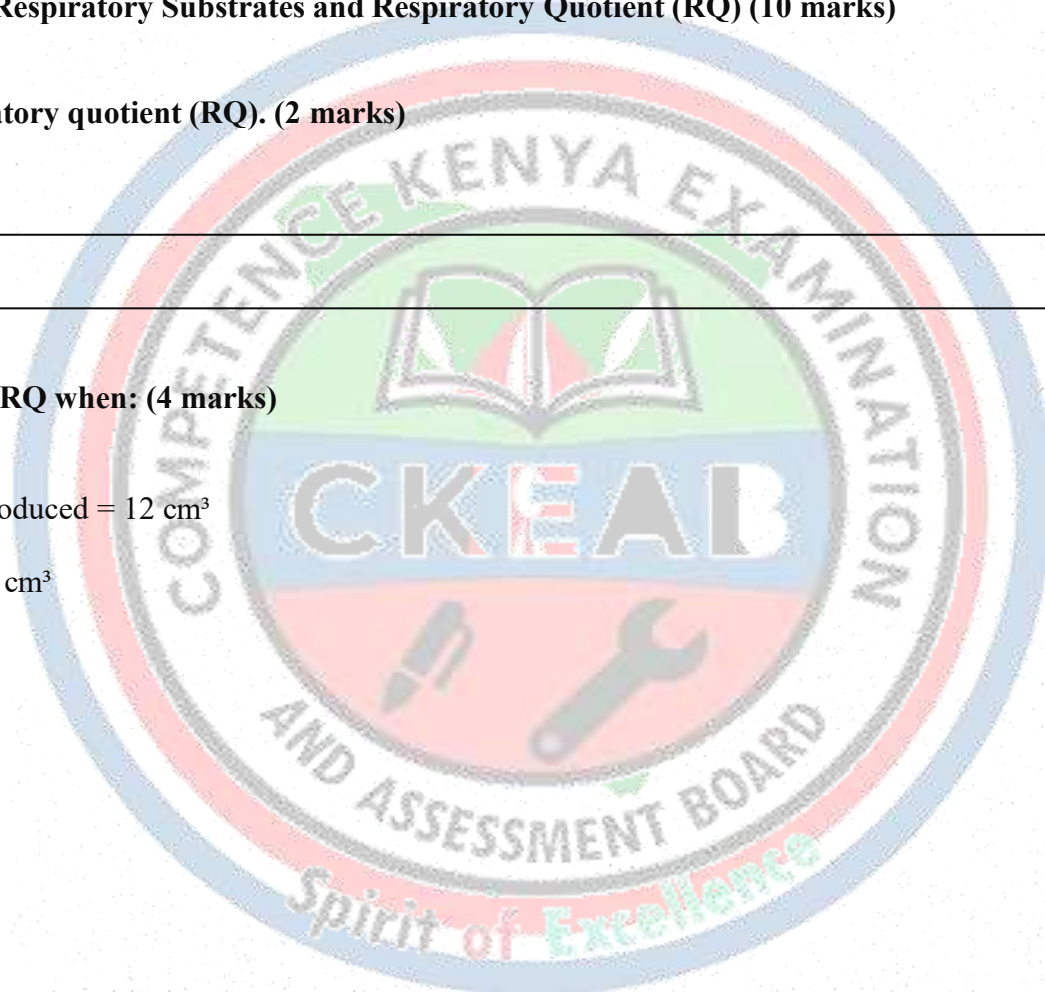
QUESTION 11: Respiratory Substrates and Respiratory Quotient (RQ) (10 marks)

(a) Define respiratory quotient (RQ). (2 marks)

(b) Calculate the RQ when: (4 marks)

Carbon dioxide produced = 12 cm^3

Oxygen used = 16 cm^3



(c) State the expected RQ value for: (3 marks)

(i) Carbohydrates

(ii) Fats

(iii) Proteins

(d) Explain what it means if RQ is greater than 1.0. (1 mark)



SUB-STRAND 3.3: GASEOUS EXCHANGE AND RESPIRATION

QUESTION 1: Characteristics of Respiratory Surfaces (10 marks)

(a) What is meant by a respiratory surface? (2 marks)

(b) State FOUR features that make a respiratory surface efficient. (4 marks)

- i. _____
- ii. _____
- iii. _____
- iv. _____

(c) Explain TWO reasons why animals need a transport system after gaseous exchange. (4 marks)

- i. _____
- ii. _____

QUESTION 2: Comparative Respiratory Structures (12 marks)

(a) Match each animal to its main respiratory structure. (5 marks)

Animal	Respiratory structure
(i) Locust	_____
(ii) Tilapia	_____
(iii) Frog	_____
(iv) Pigeon	_____
(v) Human	_____

(b) State ONE adaptation of the respiratory structure for each animal in (a). (5 marks)

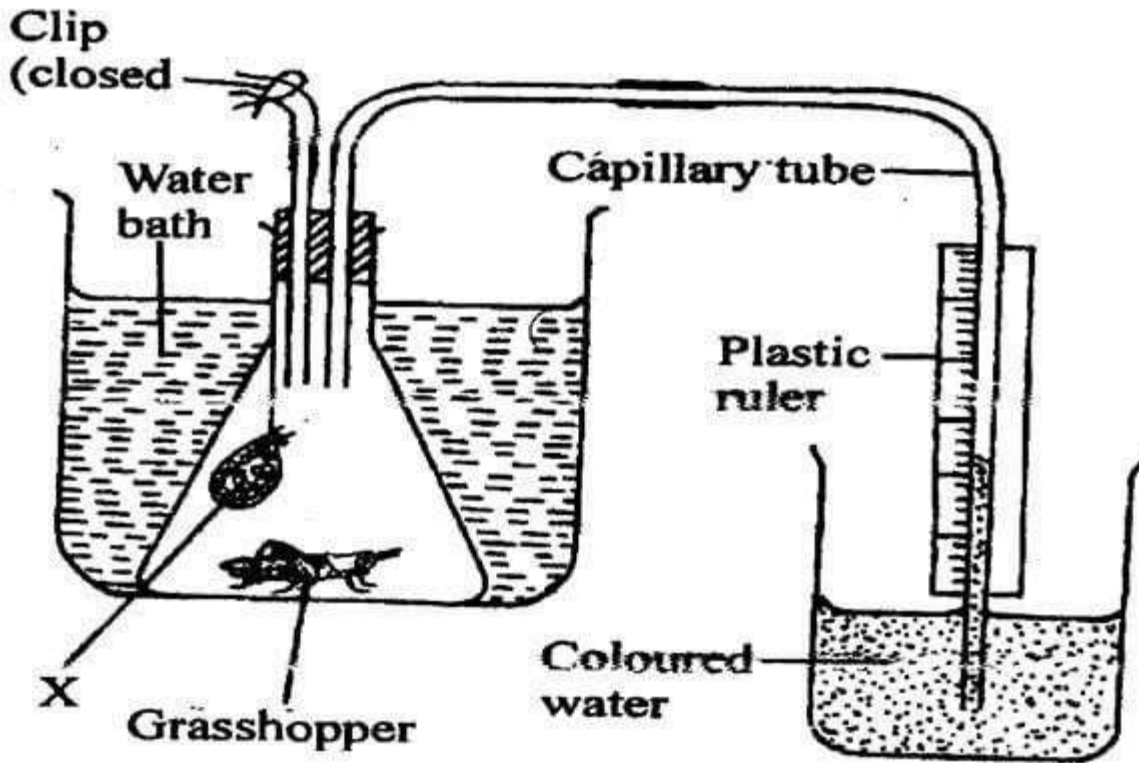
(c) State TWO reasons why fish cannot use lungs effectively in water. (2 marks)

- i. _____
- ii. _____

QUESTION 3: Insect Spiracles and Tracheoles (12 marks)

Diagram 1 shows a cross-section of an insect spiracle.

a) The diagram below illustrates an experiment on respiration in a small insect.



Explain the observation made after 10 minutes in the above experiment (3 marks)

(b) State THREE functions of spiracles in insects. (3 marks)

- i. _____
- ii. _____
- iii. _____

(c) Explain how the valve helps the insect survive in a dry environment. (3 marks)

(d) State TWO differences between trachea and tracheoles. (4 marks)

- i. _____
- ii. _____

QUESTION 4: Fish Gills and Counter-current System (12 marks)

(a) What is meant by counter-current flow? (2 marks)

(b) Explain how counter-current flow increases oxygen absorption in fish. (4 marks)

(c) State THREE adaptations of gills that increase the rate of diffusion. (6 marks)

- i. _____
- ii. _____
- iii. _____

QUESTION 5: Amphibian Respiration (10 marks)

(a) State TWO reasons why amphibians must keep their skin moist. (2 marks)

i. _____

ii. _____

(b) Explain how gaseous exchange occurs through the skin in frogs. (4 marks)

i. _____

ii. _____

iii. _____

iv. _____

(c) State TWO differences between respiration in tadpoles and adult frogs. (4 marks)

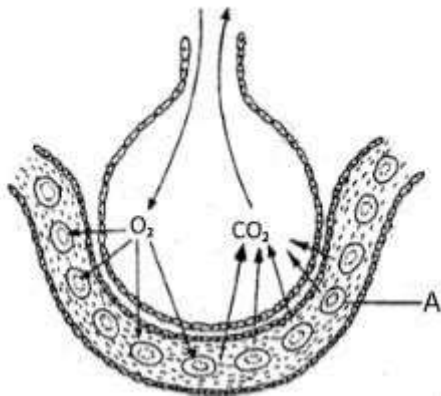
i. _____

ii. _____

QUESTION 6: Human Alveoli (12 marks)

Diagram 3 shows an alveolus.

(a) The diagram below shows the exchange of gases in alveolus.



Name the cell labelled A. (1 mark)

(b) Name TWO gases exchanged between alveoli and blood. (2 marks)

i. _____

ii. _____

(c) State FOUR adaptations of alveoli for efficient gaseous exchange. (4 marks)

i. _____

ii. _____

iii. _____

iv. _____

(d) Explain how oxygen is transported from the lungs to body cells. (4 marks)

i. _____

ii. _____

iii. _____

iv. _____

(e) State TWO effects of smoking on alveoli. (2 marks)

i. _____

ii. _____

QUESTION 7: Breathing Mechanism (12 marks)

(a) State TWO functions of the diaphragm. (2 marks)

i. _____

ii. _____

(b) Describe the process of inhalation in humans. (5 marks)

(c) Describe the process of exhalation in humans. (5 marks)

- i. _____
- ii. _____
- iii. _____
- iv. _____
- v. _____
- vi. _____

QUESTION 8: Aerobic and Anaerobic Respiration (10 marks)

(a) State TWO similarities between aerobic and anaerobic respiration. (2 marks)

- i. _____
- ii. _____

(b) State THREE differences between aerobic and anaerobic respiration. (6 marks)

- i. _____
- ii. _____
- iii. _____

(c) Name ONE product of anaerobic respiration in: (2 marks)

- (i) Animals: _____
- (ii) Yeast: _____

QUESTION 9: Investigating Respiration Rate (10 marks)

A student carried out an experiment using germinating seeds and a respirometer.

(a) Name the gas absorbed by germinating seeds during respiration. (1 mark)

(b) Explain why potassium hydroxide (KOH) is used in a respirometer. (2 marks)

i. _____

ii. _____

(c) State TWO factors that affect the rate of respiration in living organisms. (2 marks)

i. _____

ii. _____

(d) Explain how temperature affects respiration rate. (3 marks)

i. _____

ii. _____

iii. _____

(e) State TWO precautions to ensure accurate results. (2 marks)

i. _____

ii. _____

QUESTION 10: Oxygen Debt and Energy Requirements (12 marks)

(a) State TWO activities that cause oxygen debt. (2 marks)

i. _____

ii. _____

(b) Explain why oxygen debt occurs in muscles during vigorous exercise. (4 marks)

i. _____

ii. _____

iii. _____

iv. _____

(c) State THREE ways the body repays oxygen debt after exercise. (3 marks)

- i. _____
- ii. _____
- iii. _____

(d) State THREE factors that affect energy requirements in humans. (3 marks)

- i. _____
- ii. _____
- iii. _____

QUESTION 11: Respiratory Quotient (RQ) (10 marks)

(a) Write the formula for calculating RQ. (2 marks)

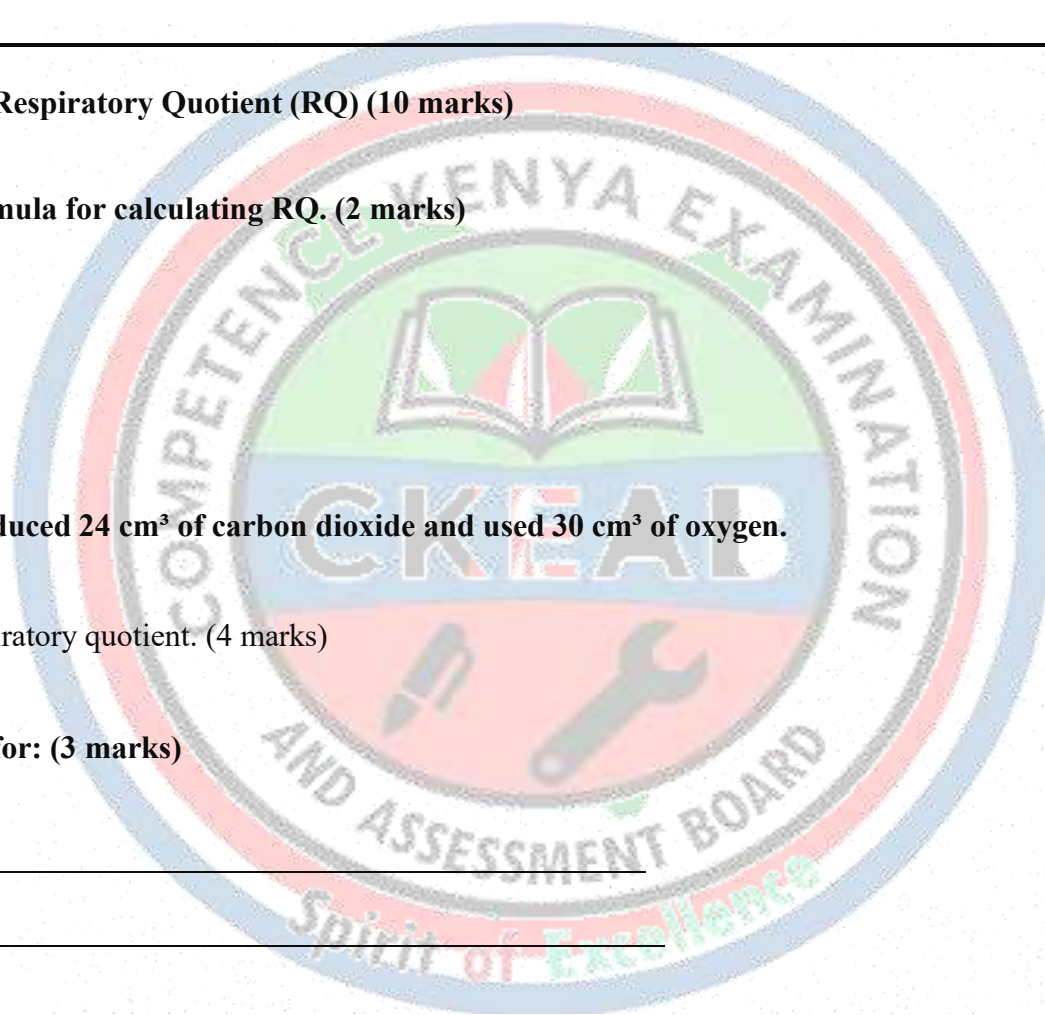
(b) A person produced 24 cm^3 of carbon dioxide and used 30 cm^3 of oxygen.

Calculate the respiratory quotient. (4 marks)

(c) State the RQ for: (3 marks)

- (i) Carbohydrates: _____
- (ii) Fats: _____
- (iii) Proteins: _____

(d) Explain why fats have a lower RQ than carbohydrates. (1 mark)



SUB-STRAND 3.3: GASEOUS EXCHANGE AND RESPIRATION

QUESTION 1: Gaseous Exchange (10 marks)

(a) Define gaseous exchange. (2 marks)

(b) State FOUR reasons why animals must carry out gaseous exchange. (4 marks)

- i. _____
- ii. _____
- iii. _____
- iv. _____

(c) Explain TWO ways by which animals maintain a concentration gradient during gaseous exchange. (4 marks)

- i. _____
- ii. _____

QUESTION 2: Respiratory Surfaces (12 marks)

(a) State FOUR characteristics of respiratory surfaces in animals. (4 marks)

- i. _____
- ii. _____
- iii. _____
- iv. _____

(b) Explain how each of the following features increases efficiency of gaseous exchange: (6 marks)

(i) Large surface area

- i. _____
- ii. _____
- iii. _____

(ii) Thin surface

- i. _____
- ii. _____
- iii. _____

(iii) Moist surface

- i. _____
- ii. _____
- iii. _____

(iv) Rich blood supply

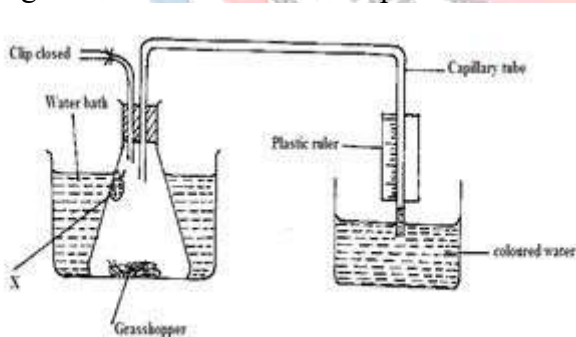
- i. _____
- ii. _____
- iii. _____

(c) State TWO disadvantages of having a large respiratory surface. (2 marks)

- i. _____
- ii. _____

QUESTION 3: Insects – Tracheal System (12 marks)

a. The diagram below illustrates an experiment to determine the rate of respiration in a small insect.



i. Name the chemical compound labelled X and state its function. (2 marks)

ii. What changes would you expect to observe in the level of the coloured water in the capillary tube after the experiment has run for 10 minutes? (1 mark)

iii. Explain the changes you have stated in (b) (ii) above. (3 marks)

b. Why was it necessary to place the flask in a water bath? (1 mark)

(c) State THREE adaptations of tracheoles for efficient gaseous exchange. (6 marks)

- i. _____
- ii. _____
- iii. _____

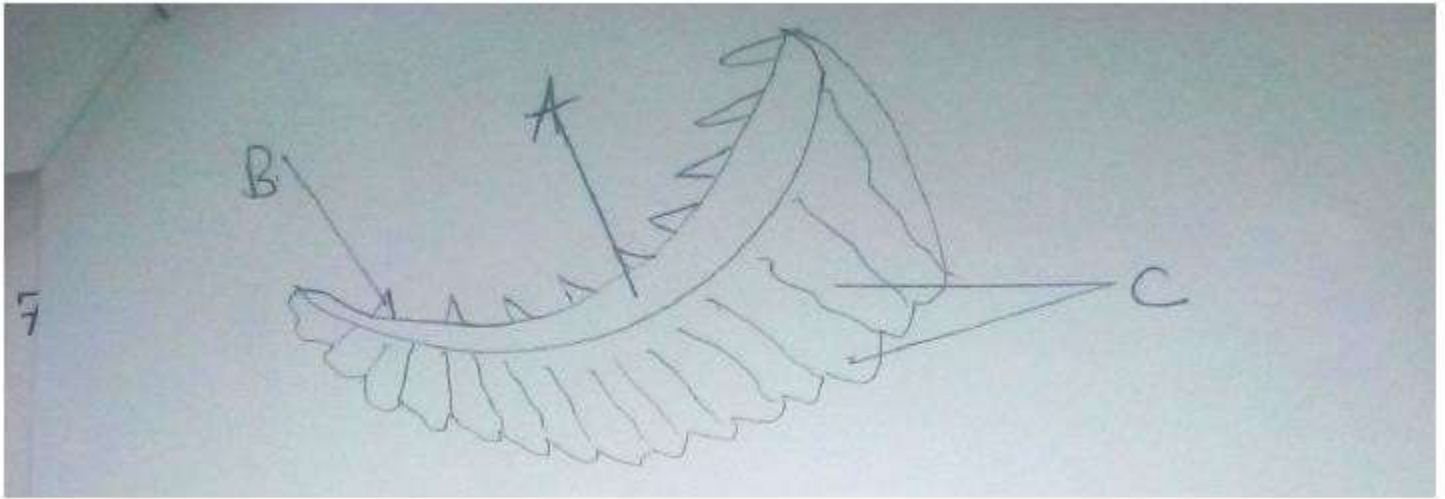
(d) Explain how ventilation occurs in insects during flight. (3 marks)

- i. _____
- ii. _____
- iii. _____

QUESTION 4: Fish – Gill Structure (12 marks)

(a) The diagram below illustrates the structure of a gill from bony fish.





1. Name the structures labeled A, B and C and give their functions. (3 mks)

A: _____

B: _____

C: _____

2. In what ways are the structures labeled C adapted for their function? (3 mks)

(b) State THREE adaptations of gill lamellae for efficient gaseous exchange. (6 marks)

i. _____

ii. _____

iii. _____

(c) Explain why fish die when removed from water for long. (3 marks)

i. _____

ii. _____

iii. _____

QUESTION 5: Amphibians (10 marks)

(a) Name TWO respiratory surfaces in adult frogs. (2 marks)

i. _____

ii. _____

(b) Explain TWO adaptations of the buccal cavity for gaseous exchange. (4 marks)

i. _____

ii. _____

(c) State FOUR differences between gaseous exchange in tadpoles and adult frogs. (4 marks)

i. _____

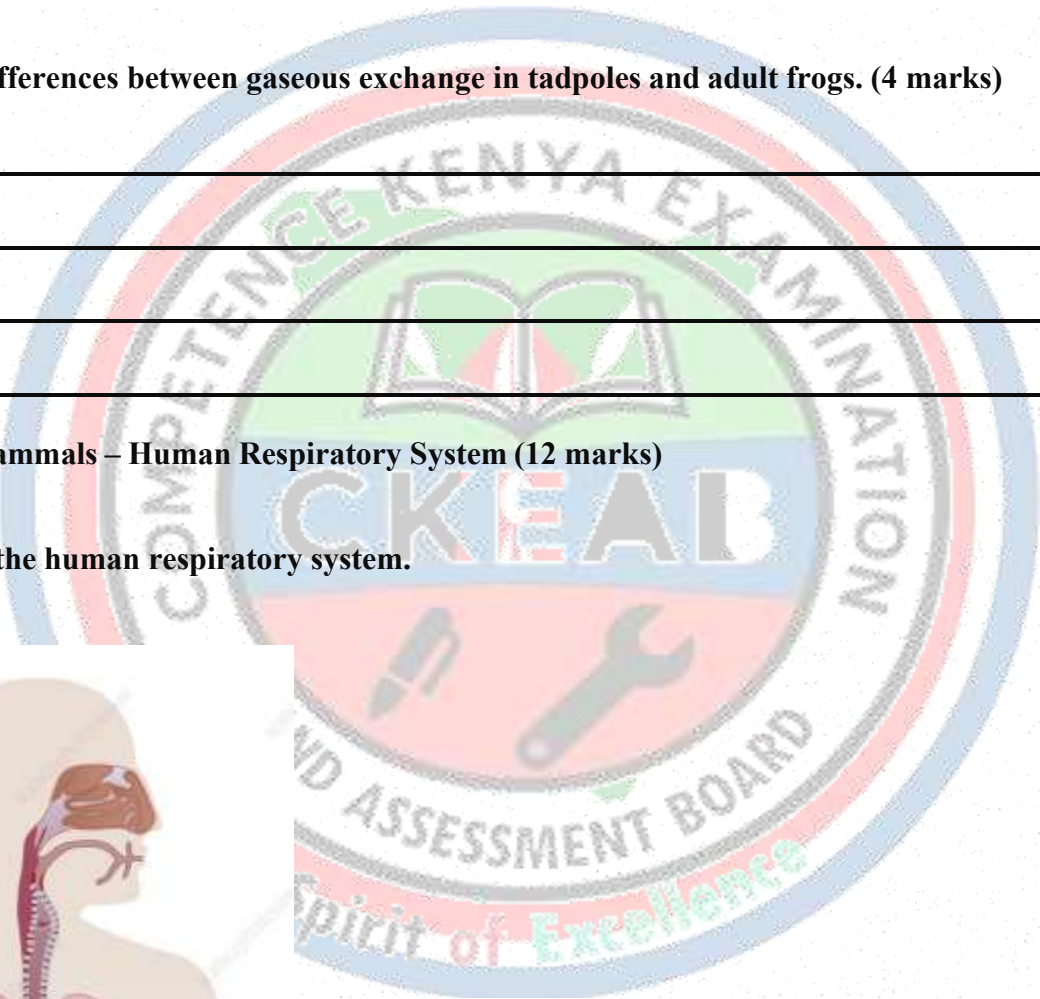
ii. _____

iii. _____

iv. _____

QUESTION 6: Mammals – Human Respiratory System (12 marks)

Diagram 3 shows the human respiratory system.



(a) Name THREE parts of the system shown above. (3 marks)

- i. _____
- ii. _____
- iii. _____

(b) State THREE functions of the trachea. (3 marks)

- i. _____
- ii. _____
- iii. _____

(c) State THREE adaptations of alveoli for gaseous exchange. (6 marks)

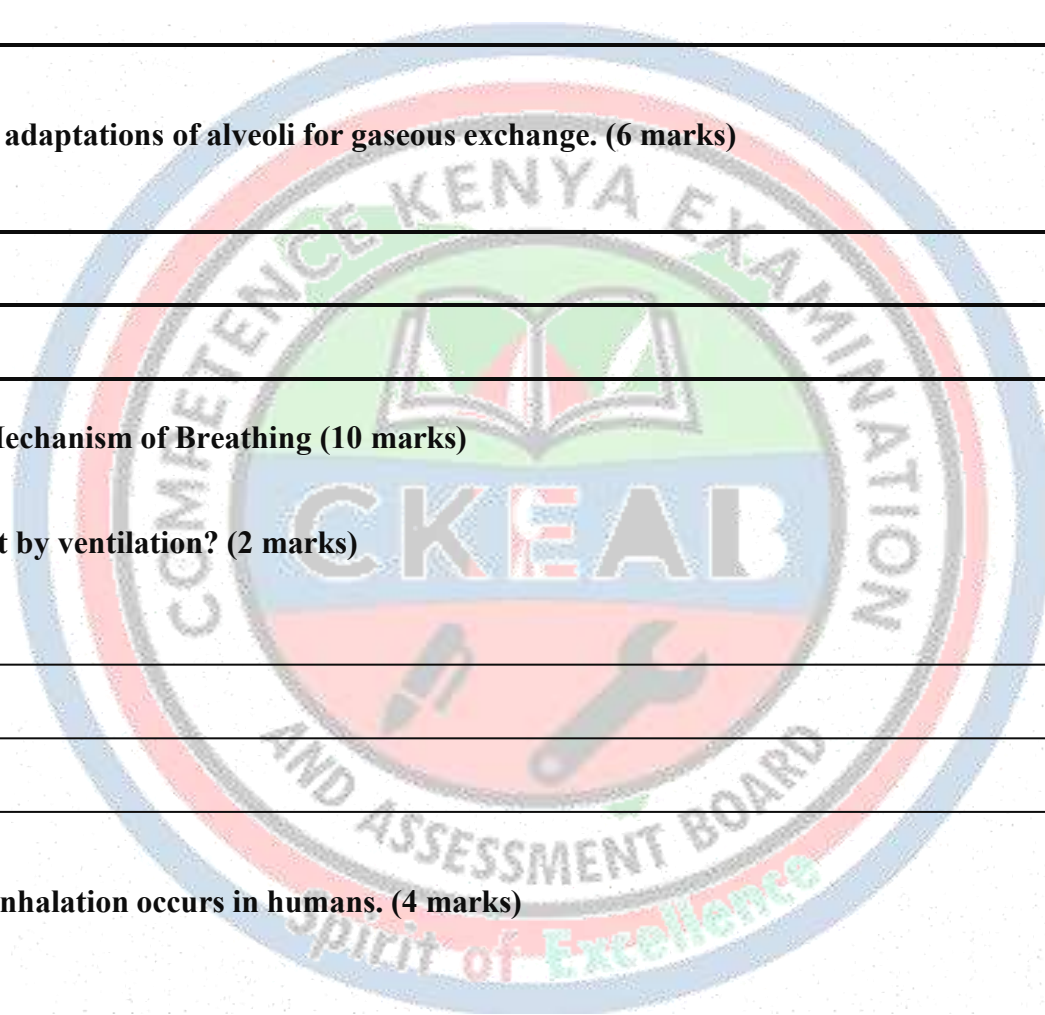
- i. _____
- ii. _____
- iii. _____

QUESTION 7: Mechanism of Breathing (10 marks)

(a) What is meant by ventilation? (2 marks)

(b) Explain how inhalation occurs in humans. (4 marks)

(c) Explain how exhalation occurs in humans. (4 marks)



QUESTION 8: Aerobic Respiration (10 marks)

(a) Define aerobic respiration. (2 marks)

(b) State TWO raw materials used in aerobic respiration. (2 marks)

i. _____

ii. _____

(c) State THREE products of aerobic respiration. (3 marks)

i. _____

ii. _____

iii. _____

(d) Explain why aerobic respiration produces more energy than anaerobic respiration. (3 marks)

QUESTION 9: Anaerobic Respiration and Oxygen Debt (12 marks)

(a) Define anaerobic respiration. (2 marks)

(b) State TWO conditions that cause anaerobic respiration in muscles. (2 marks)

i. _____

ii. _____

(c) State TWO products of anaerobic respiration in human muscles. (2 marks)

i. _____

ii. _____

(d) Explain what oxygen debt is. (3 marks)

(e) State THREE ways oxygen debt is repaid. (3 marks)

i. _____

ii. _____

iii. _____

QUESTION 10: Respiratory Substrates and RQ (12 marks)

(a) Define respiratory substrate. (2 marks)

(b) State THREE respiratory substrates used in the body. (3 marks)

i. _____

ii. _____

iii. _____

(c) Write the formula for respiratory quotient (RQ). (2 marks)

(d) A student collected gases from a respirometer experiment.

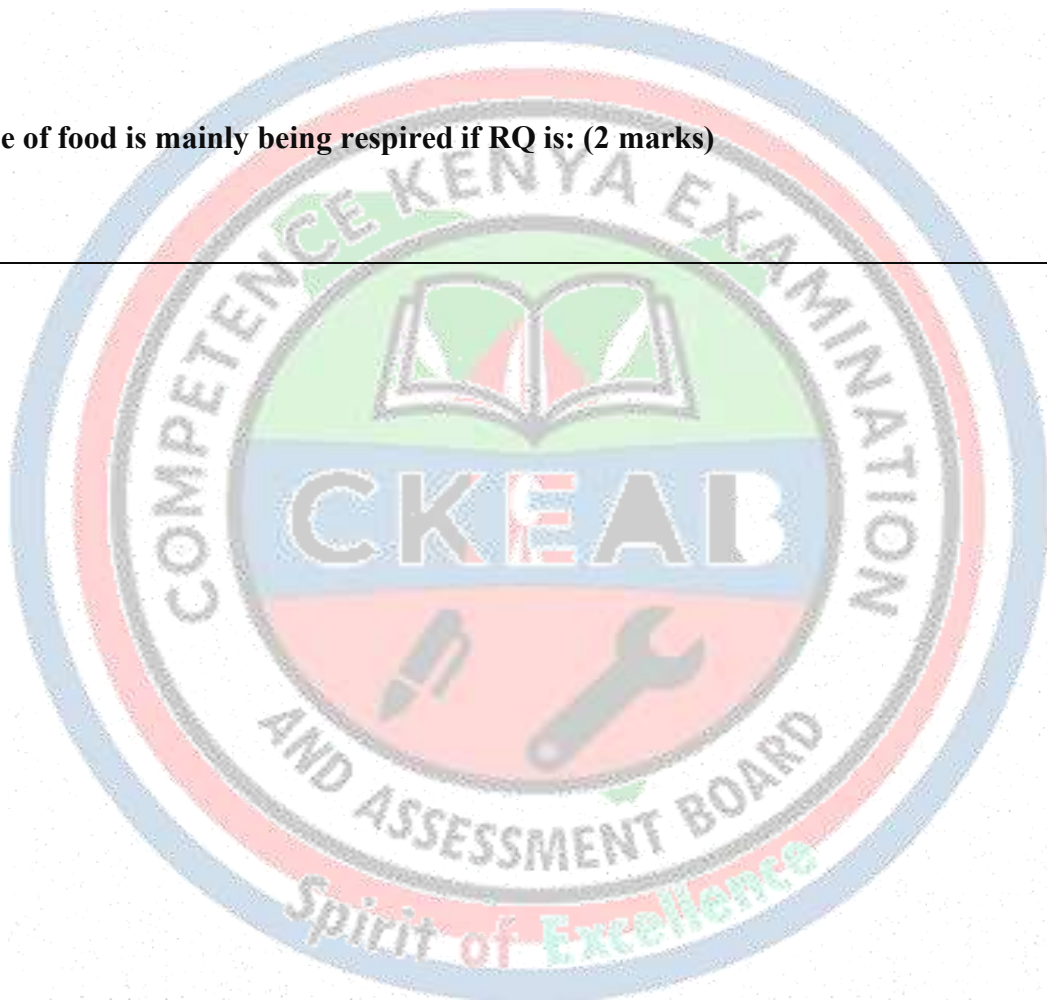
CO₂ produced = 18 cm³

O₂ used = 24 cm³

Calculate the RQ. (3 marks)

(e) State what type of food is mainly being respired if RQ is: (2 marks)

(i) 1.0: _____



FIRST EDITION

PREPARED BY COMPETENCE EDUCATION GROUP

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