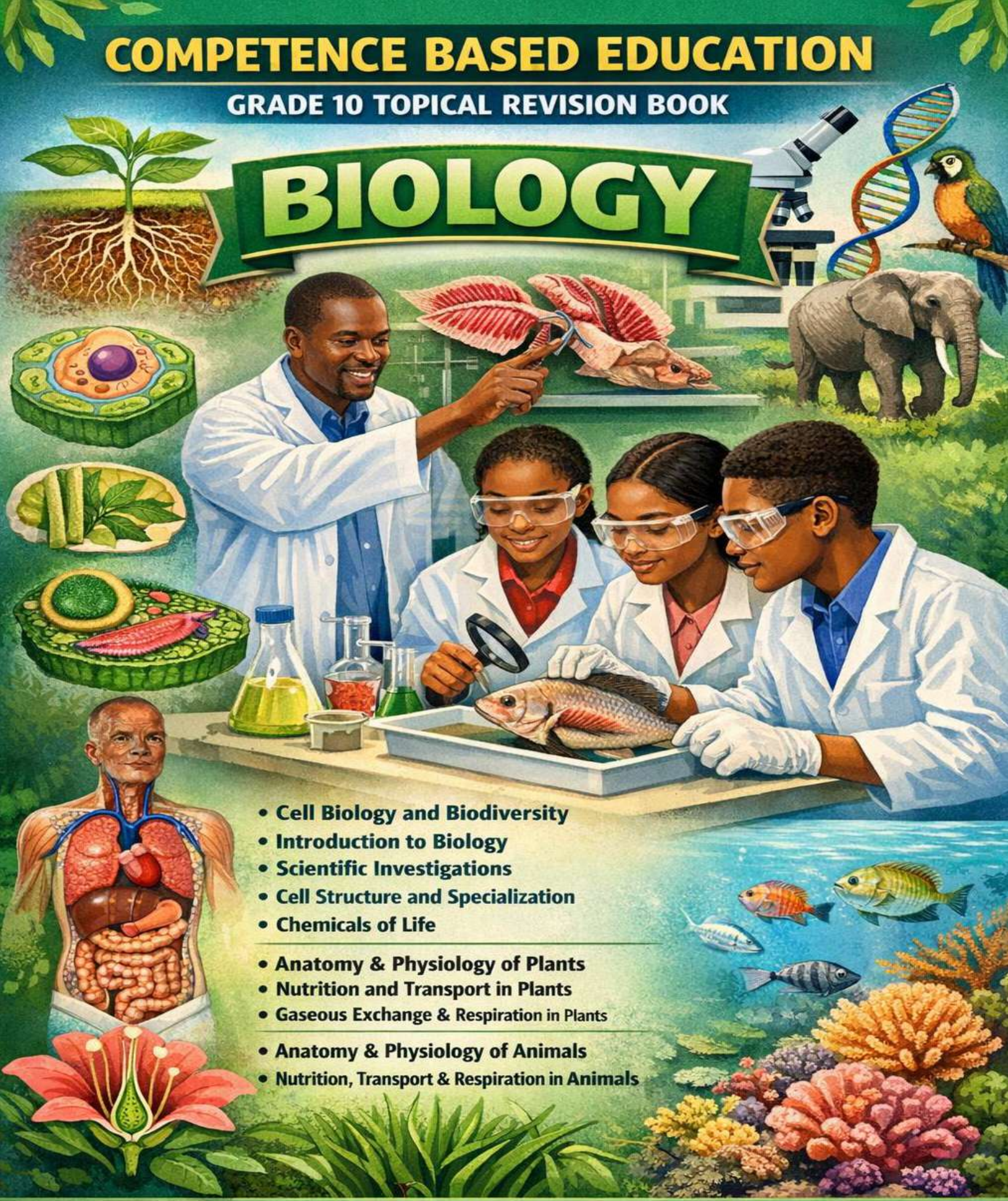
COMPETENCE BASED EDUCATION

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

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:

i. state what it studies

ii. 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._____

SET 2

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)

_____

_____i

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._____

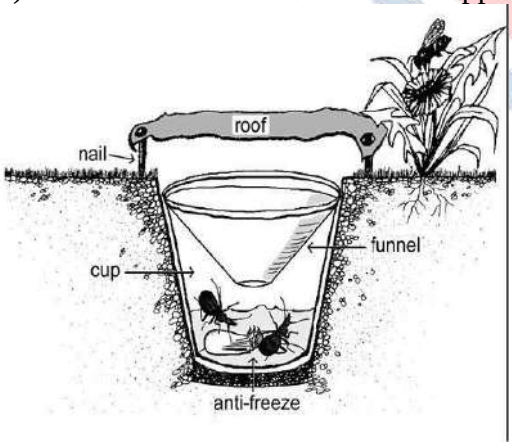
c) Explain why keeping a portfolio is important during the specimen project. (3 marks)

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.

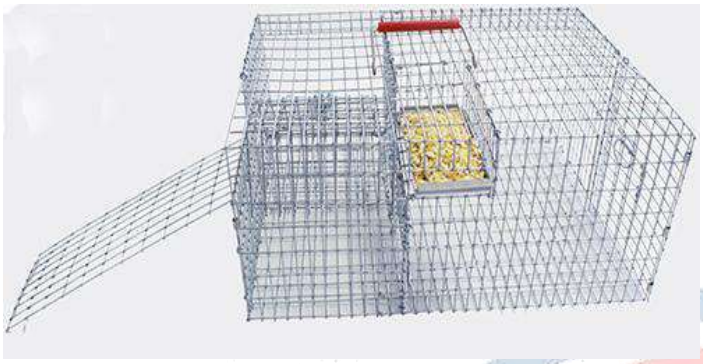
i. Name the apparatus. _____ (1 mark)

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._____

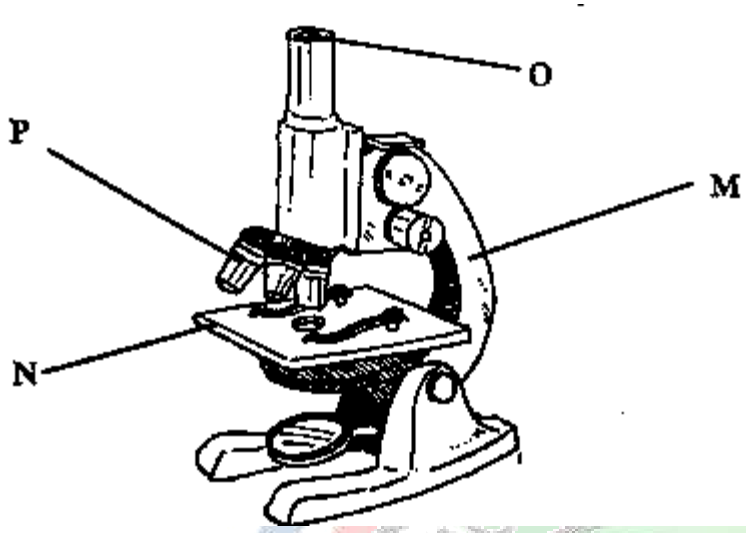
iii._____

(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)

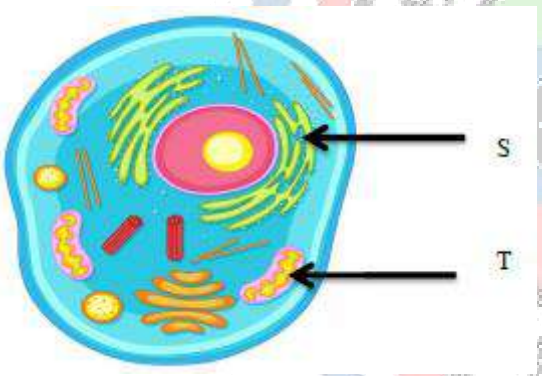
_____

_____

_____

_____

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 **×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 × 10 and that of the objective lens was × 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)

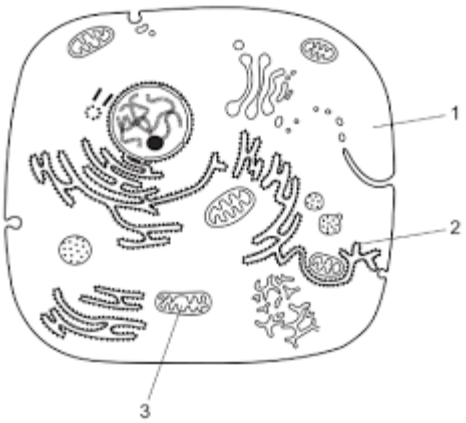
_____

_____

_____

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 reason 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)

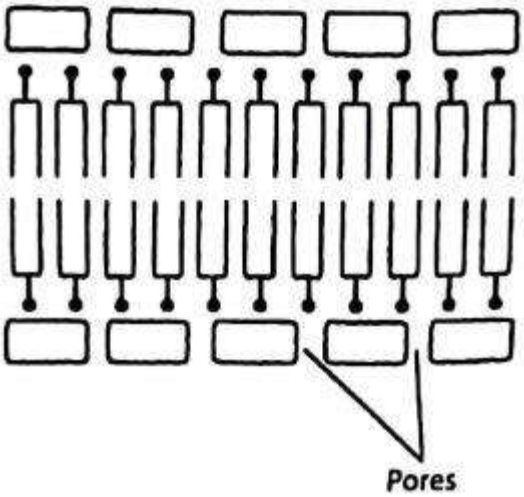
i._____

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)

   _____

   _____

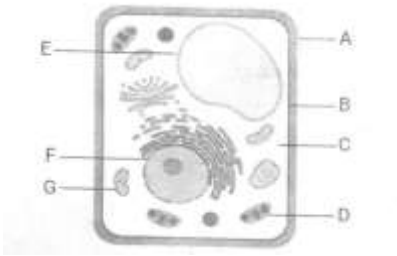
(e) What is the purpose of staining cells before observing them under a light microscope? (1 mark)

_____

_____

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)

_____

_____

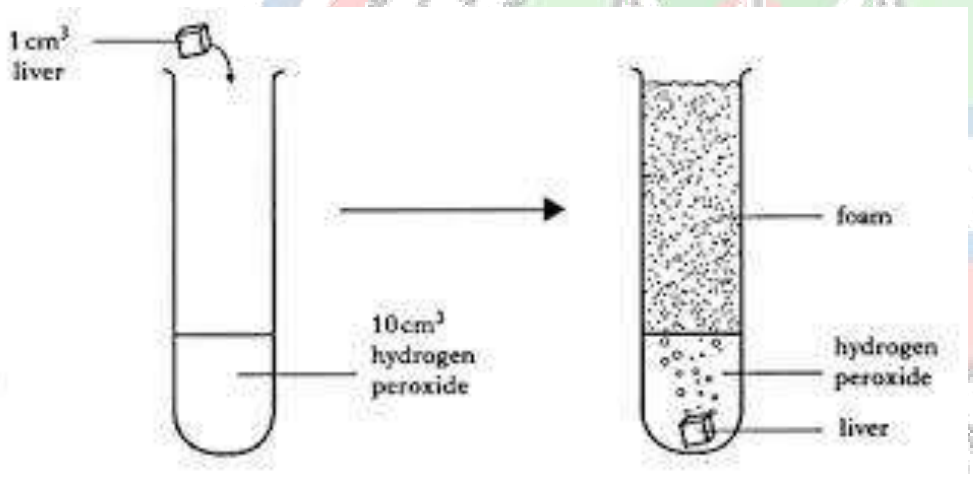
(b) State THREE characteristics of enzymes. (3 marks)

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._____

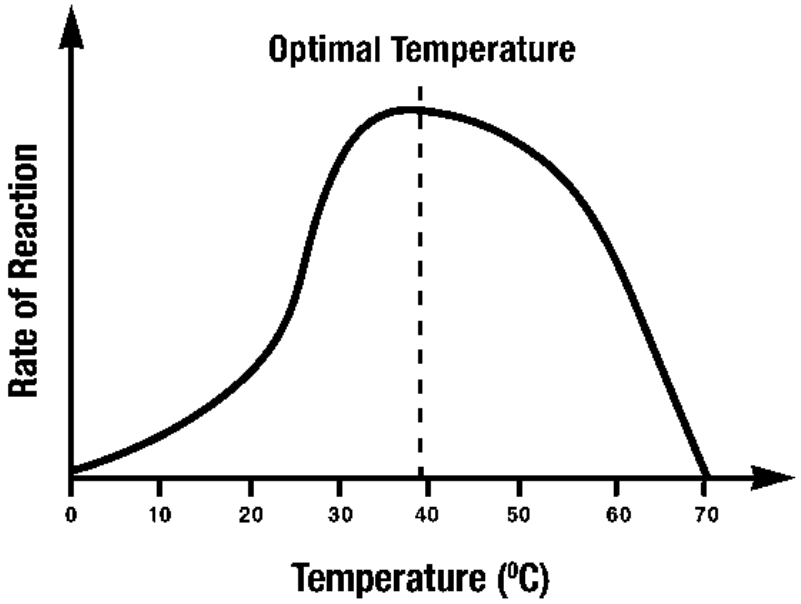
(d) State TWO importance of enzymes in living organisms. (2 marks)

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)

_____

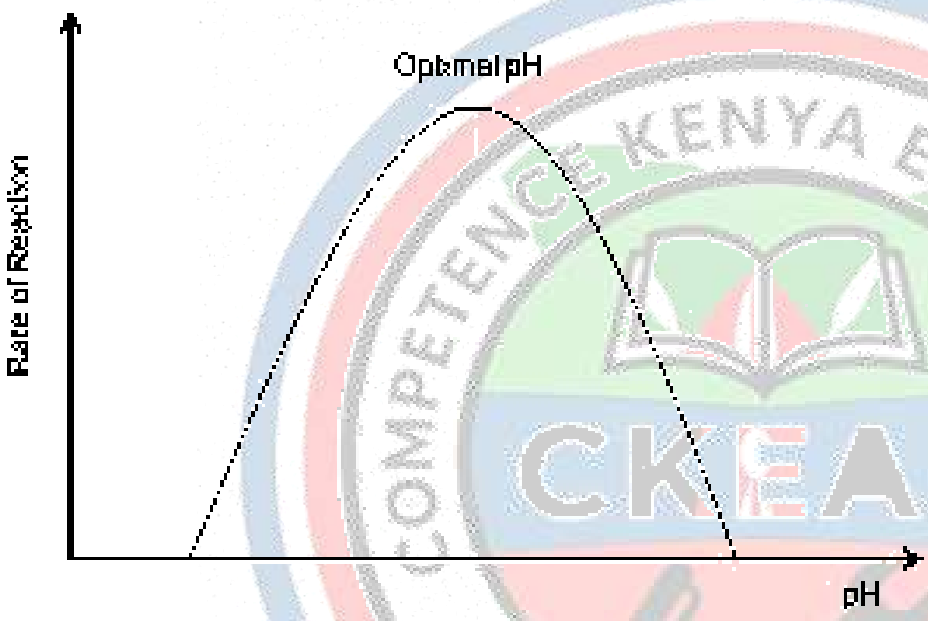
_____

(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._____

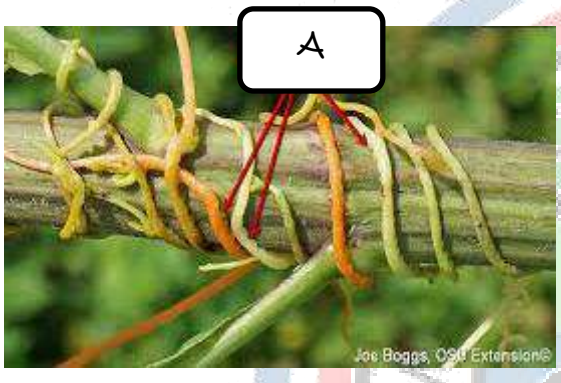
(e) Explain TWO reasons why some plants depend on heterotrophic nutrition. (4 marks)

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._____

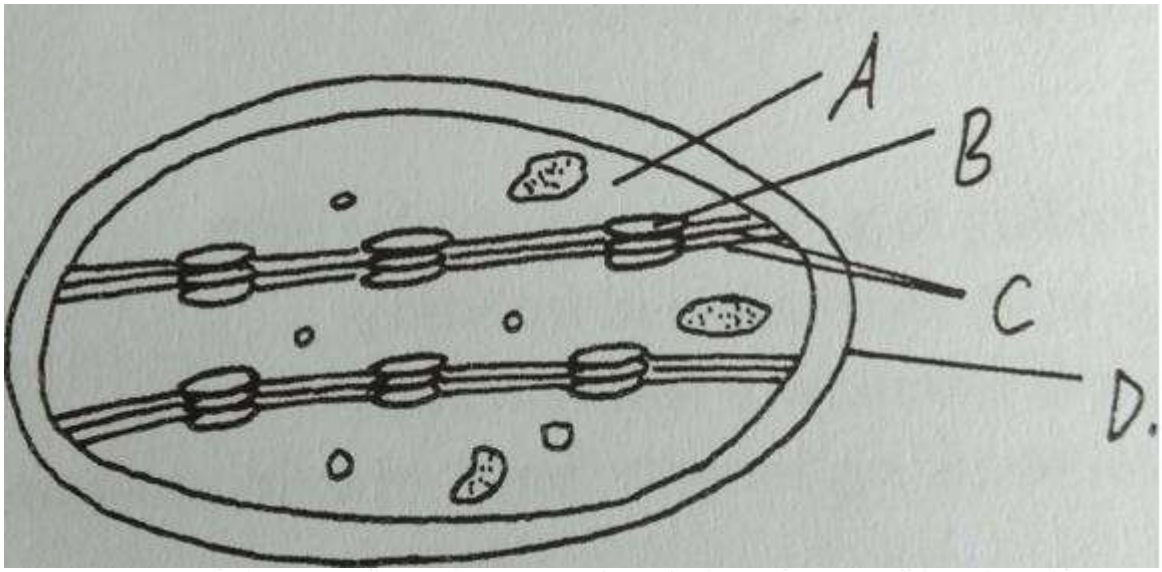
ii._____

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)

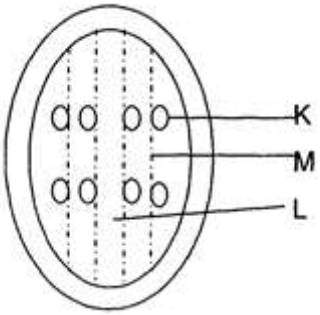
i._____

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._____

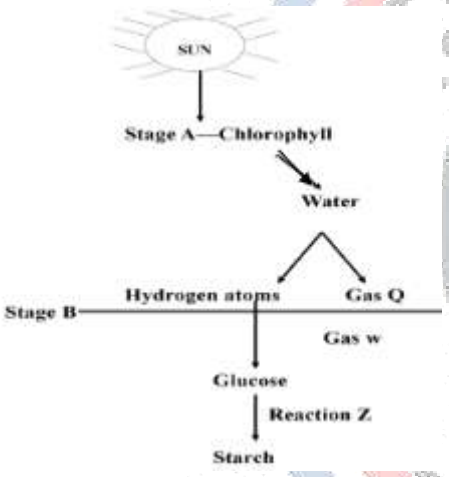
iv._____

(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:

$$6CO_{2(g)} + 6H_2O_{(l)} \xrightarrow[\text{light}]{\text{chlorophyll}} C_6H_{12}O_6 + \mathbf{x}$$

(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)

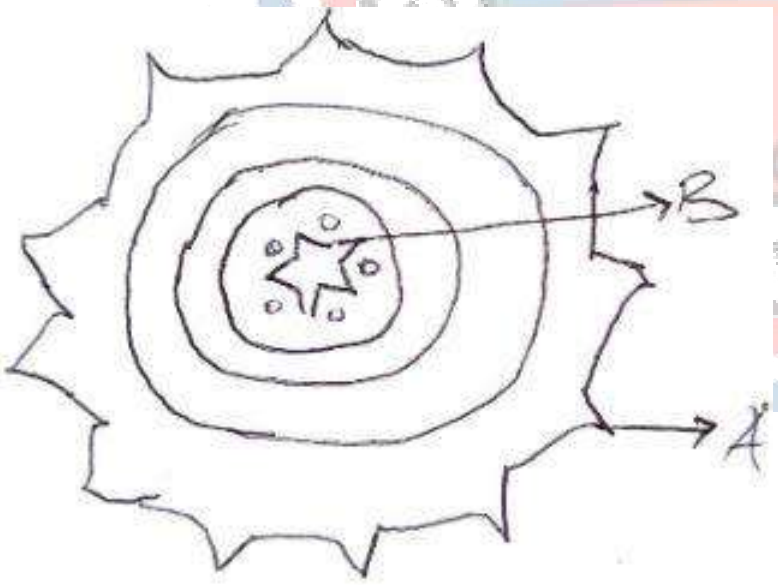
i._____

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)

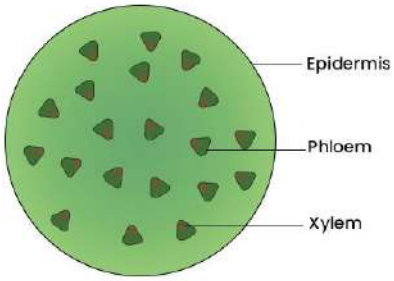
_____

_____

_____

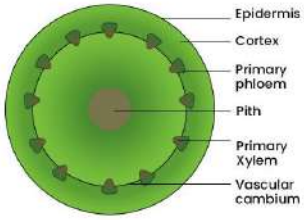
(b) Identify the type of stem shown in: (2 marks)

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)

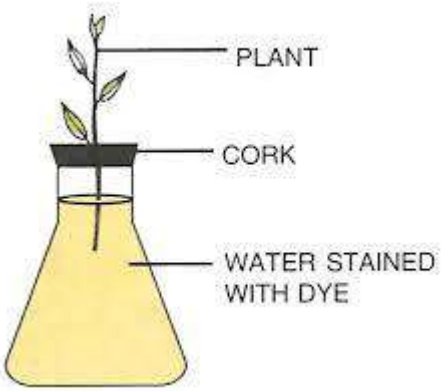
i._____

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._____

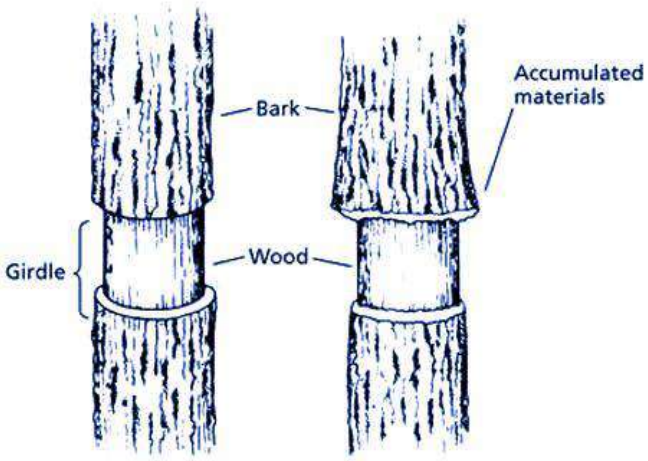
(c) Explain TWO ways plants reduce excessive transpiration. (4 marks)

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._____

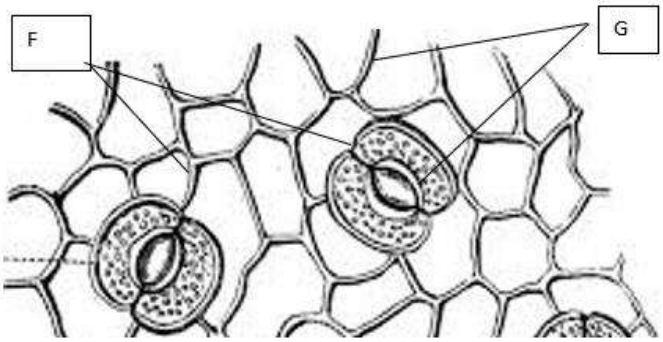
(d) Name ONE gas taken in by plants during photosynthesis. (1 mark)

_____

_____

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._____

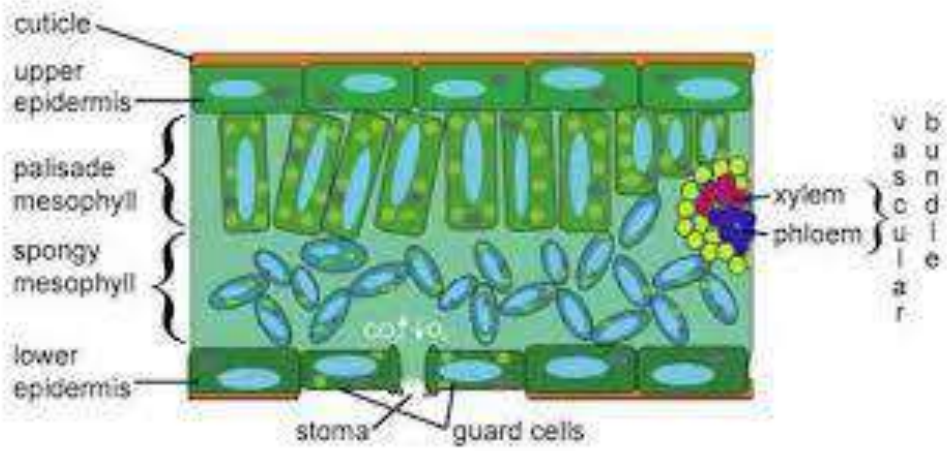
ii._____

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._____

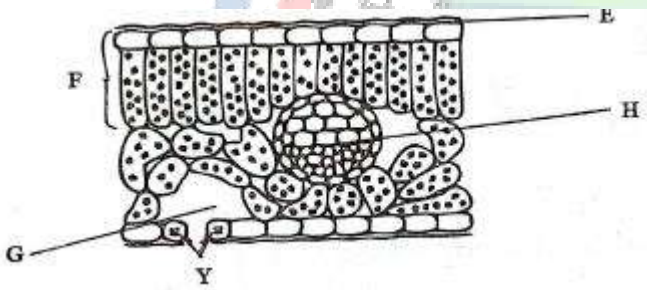
ii._____

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)

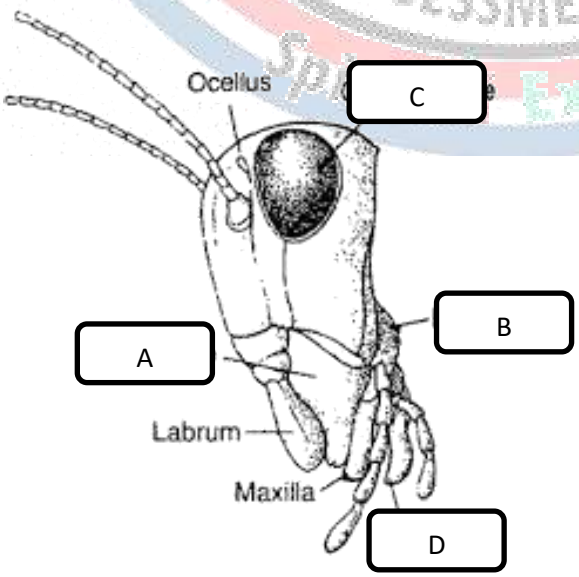
i._____

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)

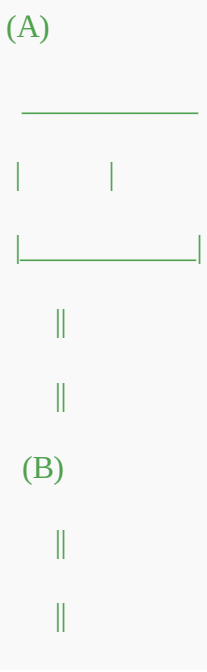
_____

_____

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)

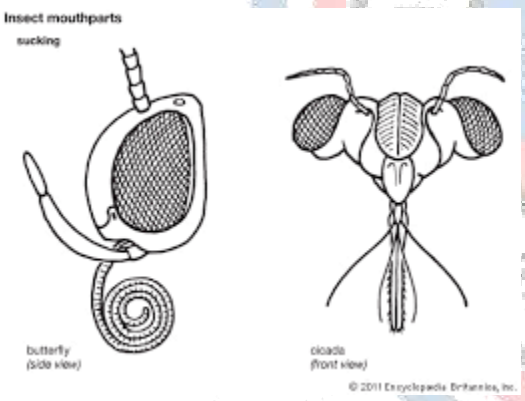
i._____

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._____

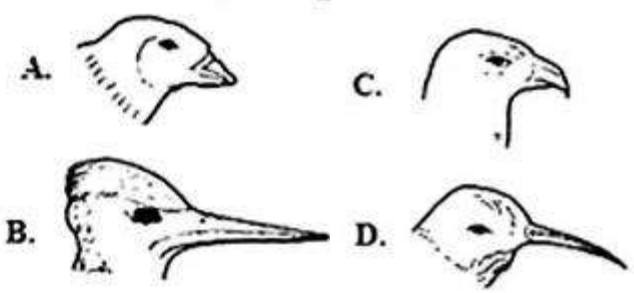
(c) State ONE disease transmitted by tsetse fly. (2 marks)

_____

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)

i. Eagle: _____

ii. Duck: _____

iii. Hummingbird/Sunbird: _____

iv. Woodpecker: _____

v. Weaver bird: _____

vi. 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:_____

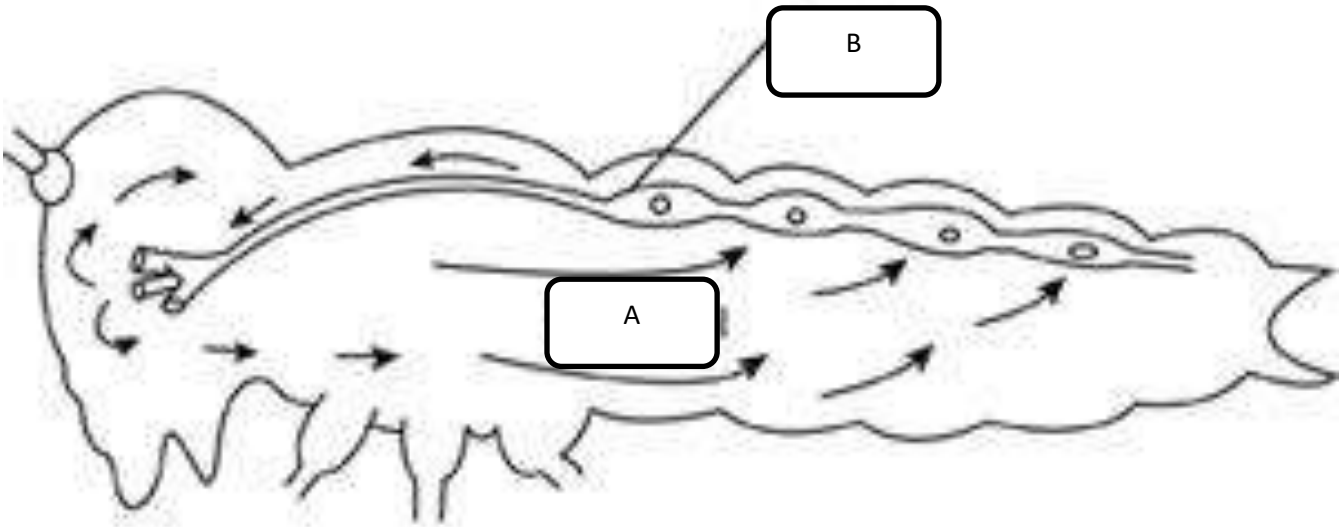
(iii) single circulation:_____

(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)

_____

_____

_____

_____

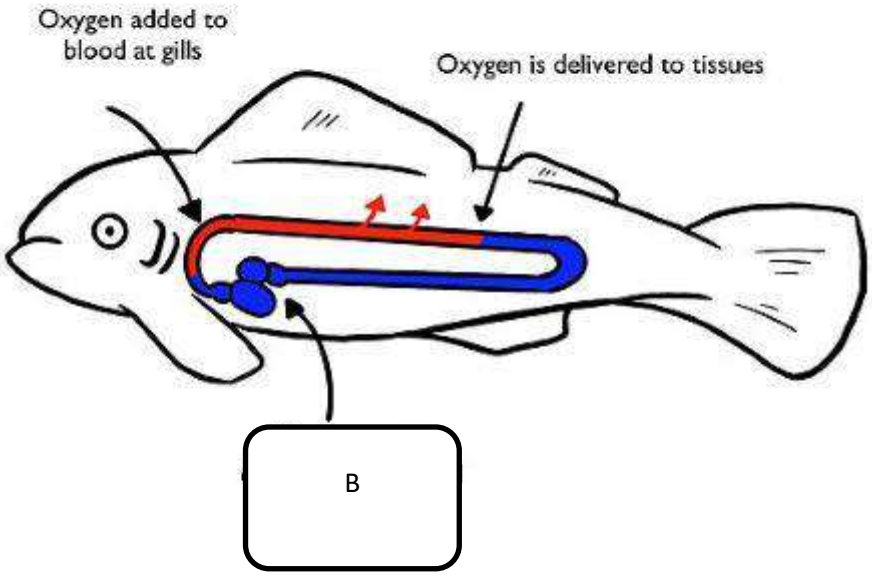
(d) State TWO reasons why insects do not use blood to transport oxygen. (4 marks)

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. _____

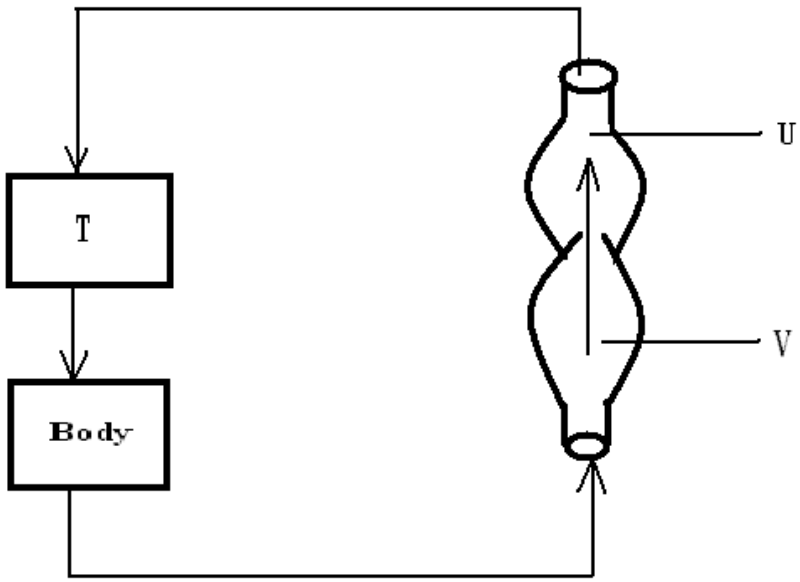
(e) State THREE limitations of single circulation in fish. (3 marks)

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:_____

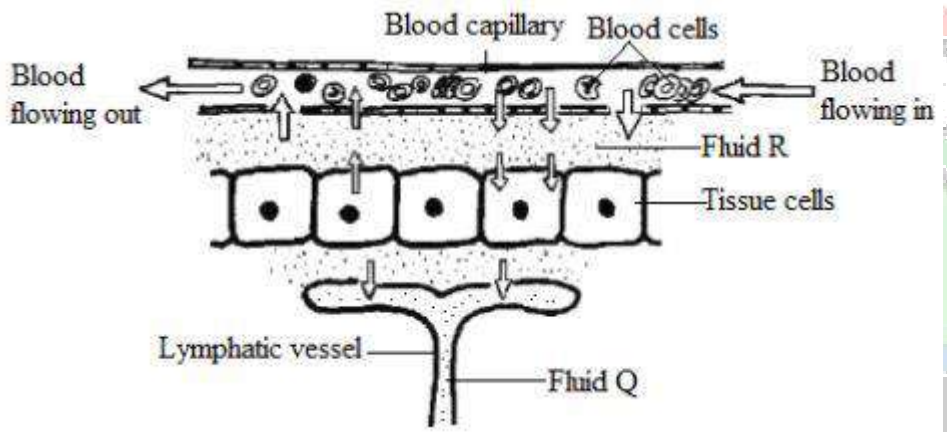
V:_____

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)

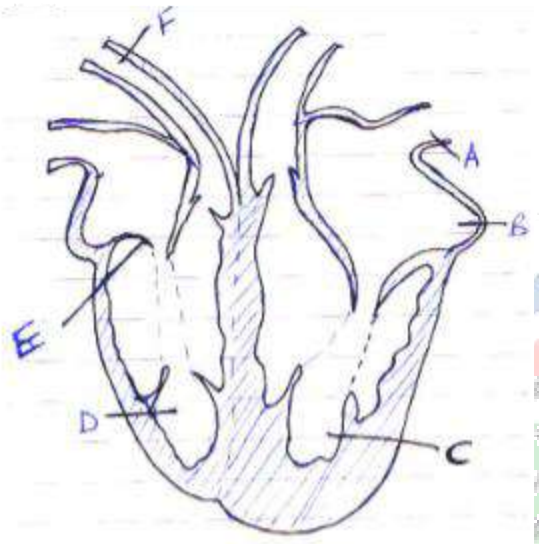
_____

_____

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)

i. Ventricular systole

ii. Atrial systole

iii. Diastole

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

i._____

ii._____

iii._____

iv._____

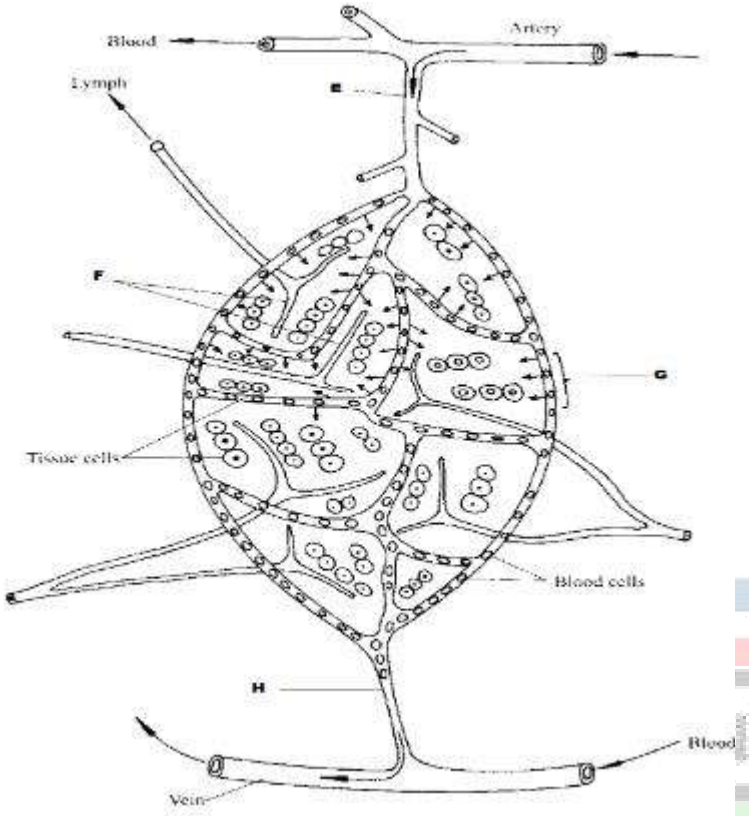
v._____

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._____

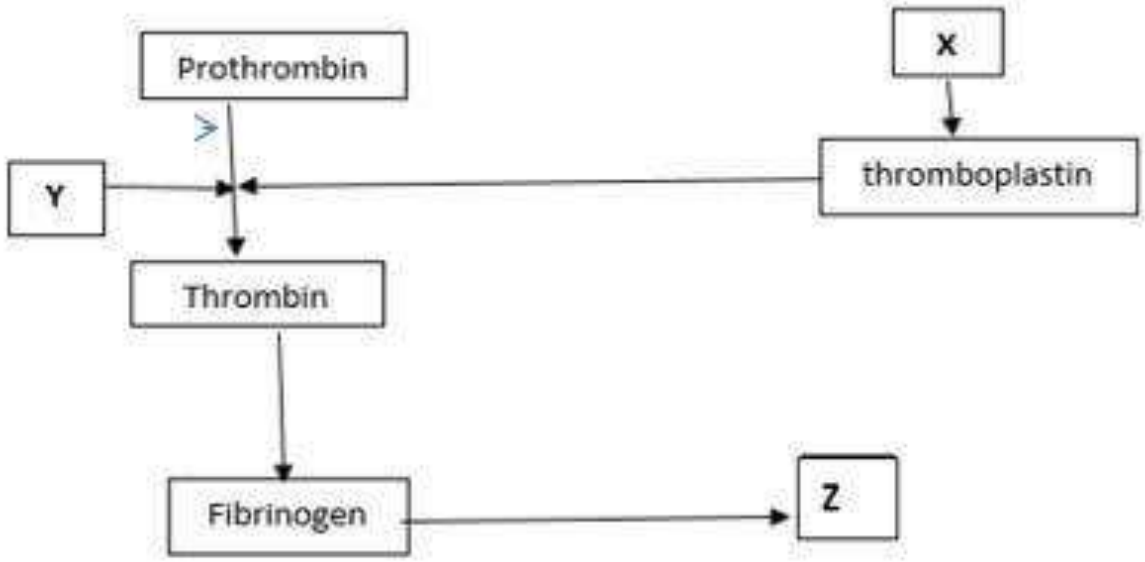
(d) Explain the meaning of Rh positive and Rh negative. (2 marks)

_____

_____

_____

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)

_____

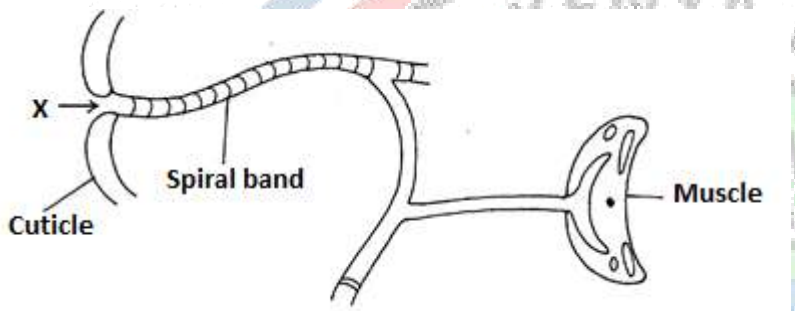
_____

._____

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.

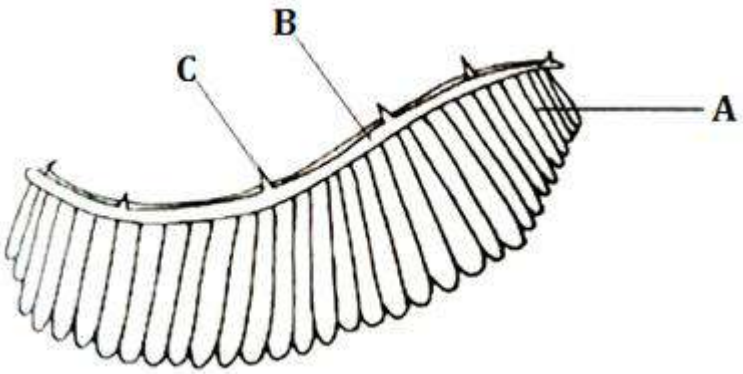
Question 5

(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)

_____

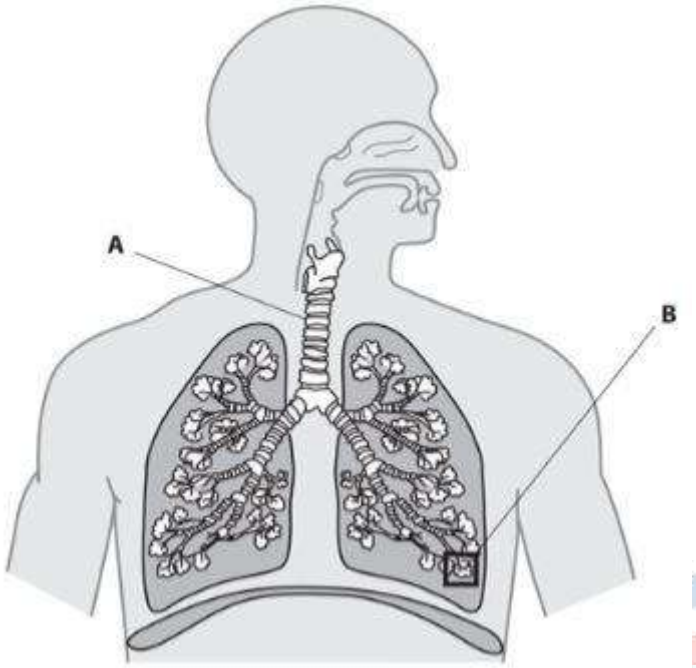
_____

_____

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)

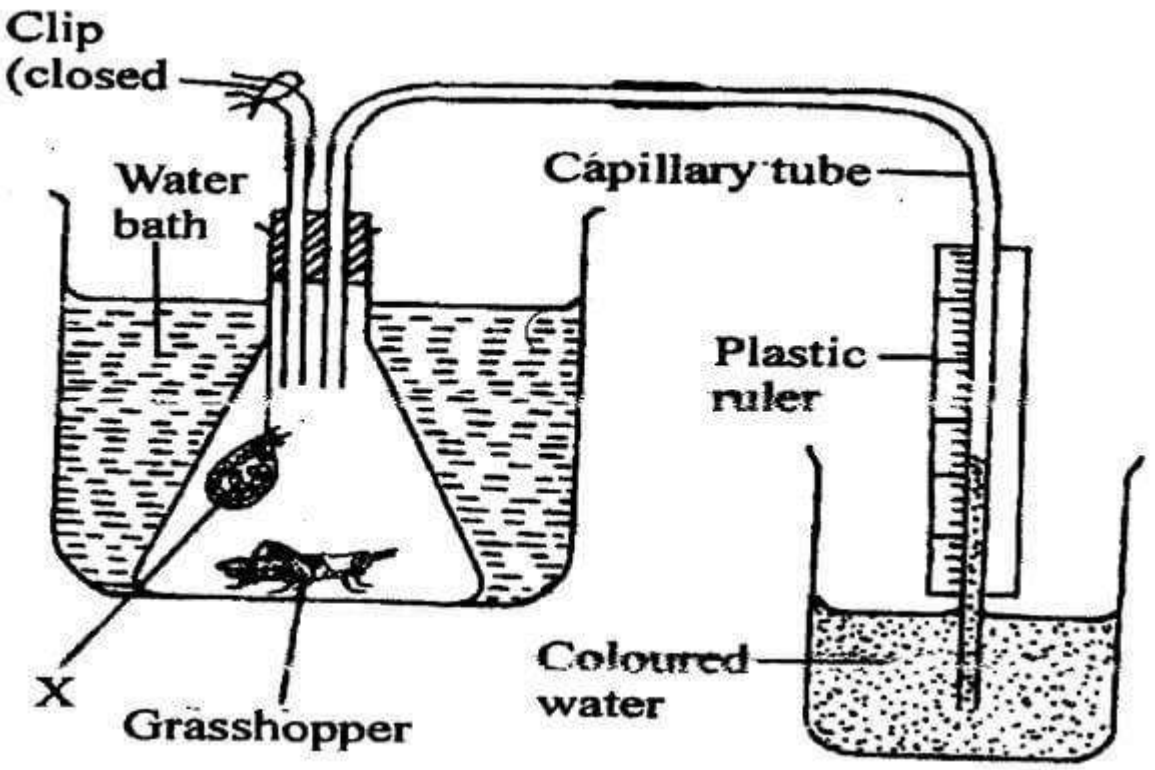
i._____

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)

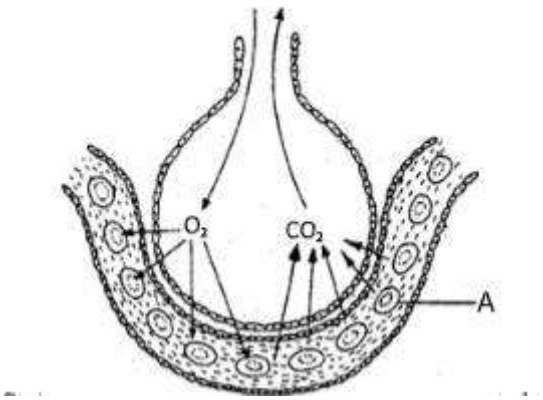
i._____

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._____

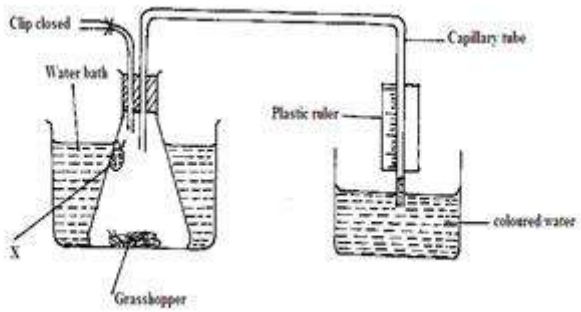
(c) State TWO disadvantages of having a large respiratory surface. (2 marks)

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)

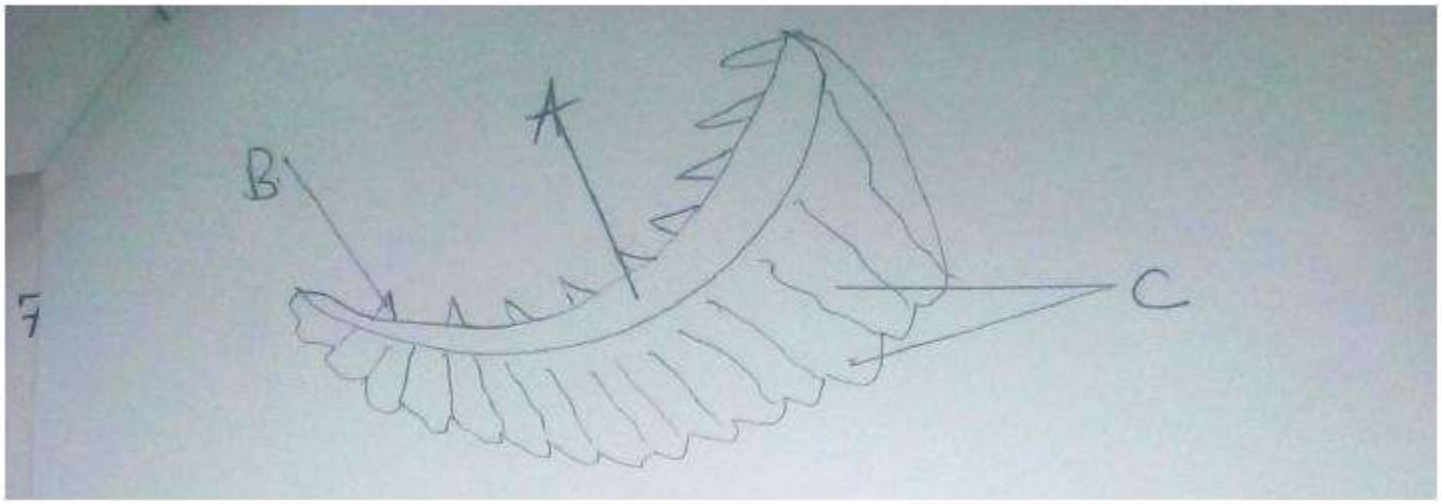
i.

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._____

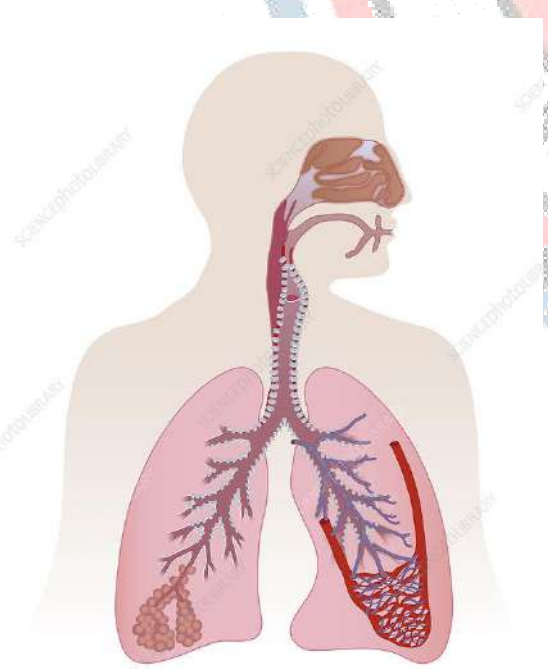
ii._____

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.

CO_2 produced = 18 cm^3

O_2 used = 24 cm^3

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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