

KCSE - FORM II BIOLOGY SYLLABUS

6.0.0 Transport in Plants and Animals (52 Lessons)

7.0.0 Gaseous Exchange (36 Lessons)

8.0.0 Respiration (18 Lessons)

9.0.0 Excretion and Homeostasis (42 Lessons)

6.0.0 TRANSPORT IN PLANTS AND ANIMALS(20 Lessons)

6.1.0 Specific Objectives

By the end of the topic, the learner should be able to:

- a) define transport and explain the necessity of transport in plants and animals
- b) relate the structure of the root, root hair, xylem and phloem to their functions
- c) relate the internal structure of the leaf to transpiration
- d) explain possible forces involved in the movement of water and mineral salts through the plant
- e) explain the significance of and factors affecting transpiration
- f) demonstrate simple experiments on transpiration
- g) distinguish between closed and open circulatory systems
- h) relate the structure of the heart and the blood vessels to their functions
- i) trace the path taken by blood from the heart to all parts of the body, and back to the heart
- j) name the common diseases of the circulatory system in humans and suggest methods of control / prevention
- k) relate the structure of the components of blood to their functions
- l) explain how oxygen and carbon dioxide are transported in the blood
- m) describe the mechanism of blood clotting and its importance
- n) describe the human blood groups and their importance in blood transfusion
- o) explain immunity and describe immune responses.

CONTENT:

6.2.1 Meaning and importance of transport systems

6.2.2 Absorption of Water and Mineral Salts

Internal structure of root and root hairs

Absorption of water

Active uptake of mineral salts

6.2.3 Transpiration

Definition of transpiration

Review of the structure of the leaf

Structure and function of xylem

Factors affecting transpiration

Forces involved in water movement in plants

- Transpiration pull

- Cohesion and adhesion

- Capillarity

- Root pressure

6.2.4 Translocation

Structure and function of phloem

Materials translocated (omit mechanisms of translocation)

6.2.5 Comparison between open and closed circulatory system

6.2.6 Mammalian Circulatory System

Structure and function of the heart, arteries, veins, and capillaries

Diseases and defects of the circulatory system (Thrombosis, Varicose veins, Arterio-sclerosis) and how to control them.

6.2.7 The Structure and Functions of Blood

Composition of blood

Functions of blood plasma

The structure and functions of red blood cells and white blood

Mechanism of blood clotting and its importance

6.2.8 Blood groups (ABO system and the Rhesus factor)

6.2.9 Immune responses

Natural and artificial immunity

Allergic reactions

Importance of vaccinations against diseases (Tuberculosis, Poliomyelitis, Measles, Diphtheria, Whooping cough)

6.3.0 Practical Activities

6.3.1 Observe permanent slides of sections of stems and roots

6.3.2 Carry out experiments to compare transpiration on lower and upper leaf surfaces

6.3.3 Observe wall charts/models

6.3.4 Analyse data on transpiration rate under different environmental conditions in Plants

6.3.5 Dissect a small mammal and observe its transport system (demonstration)

6.3.6 Make a longitudinal section of the mammalian heart to display the chambers and associated blood vessels

6.3.7 Record pulse rate at the wrist before and after vigorous activities and analyse the results

6.3.8 Demonstrate the unidirectional flow of blood in the cutaneous veins of the fore arm.

7.0.0 GASEOUS EXCHANGE (36 LESSONS)

7.1.0 Specific Objectives

By the end of the topic, the learner should be able to:

- a) explain the need for gaseous exchange in living organisms
- b) explain the mechanism of gaseous exchange in plants

- c) compare the internal structures of aquatic and terrestrial roots, stems and leaves
- d) examine various types of respiratory structures in animals and relate them to their functions
- e) state the characteristics of respiratory surfaces
- f) describe the mechanisms of gaseous exchange in protozoa, insects, fish, frog and mammal
- g) describe the factors which control the rate of breathing in humans
- h) state the causes, symptoms and prevention of respiratory diseases.

CONTENT:

7.2.1 Gaseous exchange in living organisms (necessity)

7.2.2 Gaseous Exchange in Plants

Mechanisms of opening and closing of stomata

The process of gaseous exchange in root, stem and leaves of both aquatic (floating) and terrestrial plants

7.2.3 Gaseous Exchange in Animals

Types and Characteristics of Respiratory Surfaces - cell membrane, gills, buccal cavity, skin and lungs

Mechanism of gaseous exchange in

- Protozoa - amoeba
- Insect - grasshopper
- Fish - bonyfish
- Amphibia - frog
- Mammal - human

7.2.4 Factors affecting rate of breathing in humans

7.2.5 Respiratory diseases: Asthma, Bronchitis, Pulmonary tuberculosis, Pneumonia and whooping cough

7.3.0 Practical Activities

7.3.1 Observe permanent slides of cross- sections of aerial and aquatic leaves and stems

7.3.2 Examine the distribution of spiracles on grasshopper or locust

7.3.3 Examine the gills of a bony fish

7.3.4 Dissect a small mammal and identify the structures of the respiratory system (demonstration)
Construct and use models to demonstrate breathing mechanisms in a mammal (human) Demonstrate the effect of exercise on the rate of breathing.

8.0.0 RESPIRATION (18 LESSONS)

8.1.0 Specific Objectives

By the end of the topic, the learner should be able to:

- a) explain the significance of respiration in living organisms
- b) distinguish between aerobic and anaerobic respiration
- c) describe the economic importance of anaerobic respiration in industry and at home
- d) describe experiments to show that respiration takes place in plants and animals.

CONTENT:

8.2.1 Meaning and significance of respiration

8.2.1 Tissue respiration

Mitochondrion - structure and function

Aerobic respiration (Details of kreb's cycle not required)

Anaerobic respiration in plants and animals, the products and by-products

Application of anaerobic respiration in industry and at home

Compare the energy output of aerobic and anaerobic respiration

8.3.0 Practical Activities

8.3.1 Carry out experiments to Investigate

The gas produced when food is burnt

The gas produced during fermentation

Heat production by germinating seeds.

9.0.0 EXCRETION AND HOMEOSTASIS (42 LESSONS)

9.1.0 Specific Objectives

By the end of the topic, the learner should be able to:

- a) distinguish between excretion and egestion
- b) explain the necessity for excretion in plants and animals
- c) state the uses of excretory products of plants
- d) describe the methods of excretion in a named unicellular organism
- e) relate the structures of the human skin, lungs, liver and kidney to their functions name common kidney diseases
- g) explain the concept of internal environment and homeostasis
- h) compare responses to changes in temperature by behavioural and physiological methods in animals
- i) relate heat loss to body size in
- j) describe methods by which mammals gain and lose heat
- k) explain how the functions of the following relate to homeostasis - skin, hypothalamus, liver and kidney
- l) discuss the role of antidiuretic hormone, insulin and glucagons
- m) describe simple symptoms of Diabetes mellitus and Diabetes insipidus.

CONTENT:

9.2.1 Excretion in Plants

Methods of excretion in plants

Useful and harmful excretory products of plants and their economic importance e.g. caffeine in tea and coffee, quinine, tannins, colchicines, cocaine, rubber, gum, papain (from pawpaw) and products of cannabis sativa (bhang) and khat (miraa)

9.2.2 Excretion and homeostasis in Animals

Distinction between excretion, homeostasis and egestion

Excretion in a named uni-cellular organism (protozoa)

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Structure and functions of skin and kidney

Neuro-endocrine system and homeostasis

- Water balance (blood osmotic pressure)
- Blood sugar level (control)
- Temperature regulation (mention the role of hypothalamus)

9.2.3 Common kidney diseases, their symptoms and possible methods of prevention and control

9.2.4 The role of the skin in thermoregulation, salt and water balance.

9.2.5 Major functions of the liver and their contributions to homeostasis

9.2.6 Common diseases of the liver, their symptoms and possible methods of prevention/control

9.3.0 Practical Activities

9.3.1 Examine and draw the mammalian kidney

9.3.2 Make vertical sections of the kidney to identify cortex and medulla

9.3.3 Observe permanent slides of mammalian skin

9.3.4 Investigate effect of catalase enzyme on hydrogen peroxide.