KENYA CERTIFICATE OF BASIC EDUCATION (K.C.B.E)

MARKING SCHEME

GRADE 10: BIOLOGY (Theory) – TERM 1 – JANUARY 2026

SECTION A (30 MARKS)

1. Define Biology. (2 marks)

ANY TWO of the following definitions earn full marks:

- ✓ Biology is the scientific study of living organisms.
- ✓ Biology is the study of life and life processes.
- ✓ Biology deals with the structure, function, growth, evolution, and distribution of living things.
- ✓ Biology is the study of plants and animals and how they interact with each other and the environment.
- ✓ Biology is the science that investigates the characteristics and behaviour of organisms.
- ✓ Biology involves the study of cells, tissues, organisms and ecosystems.

2. State two broad branches of Biology. (2 marks)

a) **Botany**
b) **Zoology**

Other acceptable broad branches:

i. Major Branches

- ✓ **Botany** – Study of plants
- ✓ **Zoology** – Study of animals
- ✓ **Microbiology** – Study of microorganisms
- ✓ **Ecology** – Study of the relationship between organisms and their environment
- ✓ **Genetics** – Study of heredity and variation
- ✓ **Anatomy** – Study of structure of organisms
- ✓ **Physiology** – Study of functions of body parts
- ✓ **Taxonomy** – Study of classification
- ✓ **Cytology** – Study of cells
- ✓ **Embryology** – Study of development of embryos
- ✓ **Evolutionary Biology** – Study of origin and evolution of organisms

ii. Biological Branches Based on Organism Groups

- ✓ **Entomology** – Study of insects
- ✓ **Ichthyology** – Study of fish
- ✓ **Herpetology** – Study of reptiles and amphibians
- ✓ **Ornithology** – Study of birds
- ✓ **Mammalogy** – Study of mammals
- ✓ **Protozoology** – Study of protozoa
- ✓ **Mycology** – Study of fungi
- ✓ **Phycology/Botany (Algology)** – Study of algae
- ✓ **Bacteriology** – Study of bacteria
- ✓ **Virology** – Study of viruses

- ✓ **Parasitology** – Study of parasites
- ✓ **Helminthology** – Study of parasitic worms (helminths)

iii. Applied Biological Sciences

- ✓ **Biotechnology** – Use of biological processes to produce goods
- ✓ **Agricultural Biology** – Study of crop and animal production
- ✓ **Horticulture** – Growing fruits, vegetables, and ornamental plants
- ✓ **Forestry Biology** – Study of forests and forest management
- ✓ **Soil Biology** – Study of organisms in soil
- ✓ **Animal Husbandry** – Rearing and care of farm animals
- ✓ **Food Science** – Biology of food production and safety
- ✓ **Nutrition** – Study of nutrients and diet
- ✓ **Pathology** – Study of diseases
- ✓ **Epidemiology** – Study of spread and control of diseases
- ✓ **Pharmacology** – Study of drugs and their effects
- ✓ **Forensic Biology** – Biological techniques used in crime investigation
- ✓ **Medical Laboratory Science** – Diagnosis of diseases through lab tests
- ✓ **Environmental Biology** – Study of environmental systems and conservation

iv. Structural and Functional Biology

- ✓ **Histology** – Study of tissues
- ✓ **Molecular Biology** – Study of biological molecules
- ✓ **Biochemistry** – Chemical processes of living things
- ✓ **Biophysics** – Physical principles applied to biological systems
- ✓ **Neurobiology** – Study of the nervous system
- ✓ **Endocrinology** – Study of hormones
- ✓ **Immunology** – Study of the immune system
- ✓ **Cardiology** – Study of the heart
- ✓ **Haematology** – Study of blood
- ✓ **Osteology** – Study of bones

v. Environmental and Conservation Biology

- ✓ **Conservation Biology** – Protection of species and ecosystems
- ✓ **Wildlife Biology** – Study of wild animals
- ✓ **Marine Biology** – Study of ocean life
- ✓ **Freshwater Biology** – Study of aquatic freshwater ecosystems
- ✓ **Paleontology** – Study of fossils
- ✓ **Biogeography** – Distribution of organisms on Earth
- ✓ **Limnology** – Study of lakes and rivers
- ✓ **Climatobiology** – Study of climate effects on life
- ✓ **Ecosystem Ecology** – Study of energy and nutrient flow in ecosystems
- ✓ **Environmental Toxicology** – Study of pollutants' effects

vi. Modern and Advanced Biological Branches

- ✓ **Genomics** – Study of genomes
- ✓ **Proteomics** – Study of proteins
- ✓ **Bioinformatics** – Use of computers to analyze biological data
- ✓ **Stem Cell Biology** – Study of stem cells
- ✓ **Synthetic Biology** – Creating new biological systems artificially
- ✓ **Nanobiology/Nanobiotechnology** – Study of biological processes at nanoscales

- ✓ **Astrobiology** – Study of life in outer space
- ✓ **Systems Biology** – Study of complex interactions within organisms
- ✓ **Evolutionary Developmental Biology (Evo-Devo)** – Study of evolution of development
- ✓ **Reproductive Biology** – Study of reproduction
- ✓ **Cryobiology** – Study of organisms at extremely low temperatures
- ✓ **Biogerontology** – Biology of aging
- ✓ **Biomechanics** – Study of movement in living organisms
- ✓ **Computational Biology** – Mathematical modeling of biological systems

vii. Human Biology–Related Branches

- ✓ **Dermatology** – Study of skin
- ✓ **Gynecology** – Study of female reproductive system
- ✓ **Obstetrics** – Study of pregnancy and childbirth
- ✓ **Urology** – Study of urinary system
- ✓ **Ophthalmology** – Study of the eye
- ✓ **Oncology** – Study of cancer
- ✓ **Psychobiology** – Relationship between biology and behavior
- ✓ **Pulmonology** – Study of lungs
- ✓ **Gastroenterology** – Study of digestive system
- ✓ **Rheumatology** – Study of joints

3. Collecting apparatus

i) Identify the apparatus A and B

A: **Pooter** / Aspirator
B: **Pit fall trap**

ii) Apparatus for collecting flying insects

- ✓ Sweep net
- ✓ Aerial net
- ✓ Butterfly net
- ✓ Insect net
- ✓ Light trap
- ✓ Sticky trap

4. Careers one can pursue after studying Biology (ANY FOUR)

- ✓ Doctor / Medical practitioner
- ✓ Nurse
- ✓ Dentist
- ✓ Veterinary doctor
- ✓ Medical laboratory technologist
- ✓ Pharmacist
- ✓ Microbiologist
- ✓ Botanist
- ✓ Zoologist
- ✓ Ecologist
- ✓ Wildlife manager
- ✓ Forensic scientist
- ✓ Nutritionist
- ✓ Biotechnologist

- ✓ Genetic engineer
- ✓ Public health officer
- ✓ Teacher / Lecturer
- ✓ Environmental scientist
- ✓ Agricultural officer
- ✓ Marine biologist
- ✓ Entomologist
- ✓ Conservation officer

5. Branches of Biology

a) Study of microorganisms → **Microbiology**
b) Study of heredity and variation → **Genetics**
c) Study of insects → **Entomology**
d) Study of classification of living things → **Taxonomy** / **Systematics**

6. Reasons for preserving specimens (ANY TWO)

- ✓ Prevents decay or decomposition.
- ✓ Keeps specimens in good condition for long-term study.
- ✓ Maintains shape, colour, and structural details.
- ✓ Allows for accurate identification later.
- ✓ Prevents contamination by fungi and bacteria.
- ✓ Ensures specimens remain safe for storage and transport.
- ✓ Allows comparison with other specimens.

7. Characteristics of living things that motor vehicles lack (ANY TWO)

- ✓ Reproduction
- ✓ Growth
- ✓ Respiration
- ✓ Excretion
- ✓ Nutrition
- ✓ Irritability / response to stimuli
- ✓ Movement on their own (vehicles need fuel and engines, not biological movement)
- ✓ Adaptation
- ✓ Cellular organization

8. Matching apparatus

(a) Pooter → Used for collecting small crawling insects without harming them
(b) Pair of Forceps → Used for picking up small delicate animals without direct hand contact
(c) Pitfall trap → Used for trapping ground-dwelling insects or small animals

9. Precautions when collecting specimens (ANY TWO)

- ✓ Wear gloves to avoid injury or allergic reactions.
- ✓ Handle animals carefully to avoid harming them.
- ✓ Avoid poisonous or dangerous animals.
- ✓ Do not damage the natural habitat.
- ✓ Use proper equipment like forceps and nets.
- ✓ Do not collect too many specimens.
- ✓ Store specimens properly in labelled containers.

10. Differentiate Zoology and Botany (ANY FOUR POINTS)

Zoology:

- ✓ Study of animals.
- ✓ Deals with animal anatomy and physiology.
- ✓ Studies animal behaviour.
- ✓ Focuses on vertebrates and invertebrates.
- ✓ Includes entomology, ornithology, herpetology.

Botany:

- ✓ Study of plants.
- ✓ Deals with plant structure and physiology.
- ✓ Studies growth of flowers, fruits, seeds, stems, roots.
- ✓ Includes ecology, horticulture, plant genetics.
- ✓ Focuses on photosynthesis and plant reproduction.

SECTION B (40 MARKS)

11. (a) Importance of Biology in everyday life (ANY FOUR)

- ✓ Helps in understanding diseases and their prevention.
- ✓ Improves hygiene and sanitation practices.
- ✓ Contributes to food production through agriculture.
- ✓ Helps in conservation of the environment.
- ✓ Promotes understanding of nutrition and healthy diet.
- ✓ Enables development of medicines and vaccines.
- ✓ Helps in controlling pests and parasites.
- ✓ Supports waste management and recycling initiatives.
- ✓ Helps in understanding human body functions.
- ✓ Supports careers like nursing, medicine, veterinary, and pharmacy.
- ✓ Contributes to biotechnology and genetic engineering.
- ✓ Aids in sustainable use of natural resources.

(b) International conventions benefiting from Biology knowledge (ANY TWO)

- ✓ Convention on Biological Diversity (CBD)
- ✓ CITES (Convention on International Trade in Endangered Species)
- ✓ Kyoto Protocol
- ✓ Paris Agreement on Climate Change
- ✓ Ramsar Convention (Wetlands Protection)
- ✓ Stockholm Convention on Persistent Organic Pollutants
- ✓ UN Convention to Combat Desertification
- ✓ FAO agreements on plant genetic resources

12. (a) Steps in processing and preserving plant specimens (ANY SIX)

- ✓ Collect the specimen carefully without damaging parts.
- ✓ Press the specimen between newspaper sheets.
- ✓ Place the sheets in a plant press or between heavy books.
- ✓ Change blotting papers regularly to remove moisture.
- ✓ Dry the specimen completely in a warm, airy place.
- ✓ Mount the specimen on a herbarium sheet.

- ✓ Label with name, location, date, collector, and habitat.
- ✓ Store in a herbarium cabinet away from moisture and insects.
- ✓ Treat with chemicals to prevent mould or pests.

(b) Why collect only the required number of specimens (ANY EIGHT)

- ✓ Prevents overharvesting of species.
- ✓ Protects endangered plants.
- ✓ Maintains ecological balance.
- ✓ Prevents destruction of habitats.
- ✓ Avoids unnecessary killing of organisms.
- ✓ Saves time spent processing many specimens.
- ✓ Ensures sustainability of natural resources.
- ✓ Prevents wastage.
- ✓ Teaches responsible scientific practice.
- ✓ Reduces storage problems in the laboratory.
- ✓ Prevents overcrowding in specimen jars or presses.

13. (a) Scientific skills developed through Biology (ANY FIVE)

- ✓ Observation skills.
- ✓ Recording and data collection.
- ✓ Critical thinking and analysis.
- ✓ Problem-solving skills.
- ✓ Experimentation skills.
- ✓ Drawing and diagrammatic skills.
- ✓ Classification and organisation skills.
- ✓ Measurement and handling of instruments.
- ✓ Communication skills (report writing).
- ✓ Hypothesis formulation.
- ✓ Interpretation of results.
- ✓ Safety skills and laboratory discipline.

(b) Ways Biology is useful in agriculture (ANY TWO)

- ✓ Helps in controlling pests and diseases.
- ✓ Guides breeding of improved crop and livestock varieties.
- ✓ Improves soil fertility management.
- ✓ Helps understand plant nutrition and growth.
- ✓ Supports development of fertilizers and pesticides.
- ✓ Guides irrigation and farming techniques.

14. (a) Positive factors influencing choice of Biology-related career (ANY FOUR)

- ✓ Personal interest and passion.
- ✓ Strengths in science subjects.
- ✓ Availability of career opportunities.
- ✓ Good role models or mentors.
- ✓ Desire to help people (e.g., in medicine).
- ✓ Desire to protect the environment.
- ✓ Salary expectations.
- ✓ Availability of scholarships.
- ✓ Family encouragement.
- ✓ Knowledge of job requirements.

(b) Why negative factors like gender stereotypes should not determine career choice (ANY FOUR)

- ✓ Both boys and girls can succeed in any science field.
- ✓ Career choice should be based on ability, not gender.
- ✓ Gender stereotypes limit talent development.
- ✓ Society needs skilled people in all fields regardless of gender.
- ✓ Equal opportunity encourages innovation and diversity.
- ✓ Prevents discrimination in the workplace.
- ✓ Promotes fairness and human rights.
- ✓ Encourages self-confidence and ambition.

NOTE TO FACILITATORS (TEACHERS):

The marking scheme provided is not exhaustive. Facilitators are advised to use their professional judgment when awarding marks. Any correct, relevant, and scientifically or contextually acceptable answer that demonstrates understanding of the concepts should be credited. Where examples are required, learners may provide other valid examples apart from those listed in the scheme.

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