

Biology Syllabus for 9th & 10th / O - Level

Chapter 1: Introduction to Biology

1.1: Definition of Biology

- Introduction to Biology

1.2: Branches of Biology

- Zoology, Botany, Microbiology
- Morphology Anatomy and Physiology
- Histology Cell biology
- Genetics and Embryology
- Biotechnology, Biochemistry
- Socio-biology and Parasitology
- Biotechnology, Immunology
- Taxonomy Palaeontology Environmental Biology
- Entomology, Pharmacology

1.3: Relationship of Biology to Other Sciences

- Biology and Other Sciences
- Biology and Other Sciences

1.4: Careers in Biology

- Careers in Biology, Medicine / Surgery, Fisheries, Agriculture
- Careers in Biology, Animal Husbandry, Horticulture, Farming
- Careers in Biology, Forestry, Biotechnology

1.5: Division of Living Organisms in Five Groups

- Five Kingdom System
- More on Five Kingdom Classification System

1.6: Quran Instructs to Reveal Study of Life

- Quran and Biology, Muslim Scientists

1.7: Contributions of Muslim Scientists in the Field of Biology

- Quran and Biology, Muslim Scientists

1.8: The Levels of Organization of Organisms

- Level of Organization

1.9: Cellular Organization in Organisms

- Cellular Organization
- Mustard Plant Frog

Chapter 2: Solving a Biological Problem

2.1: Steps Involved in Biological Method

- Biological Method
- More one Biological Method

2.2: A Case of Malaria - An example of Biological Method

- Study of Malaria
- More Study of Malaria

2.3: Importance of Data Analysis

- Data Organization and Analysis

2.4: Mathematics as an Integral Part of the Scientific Process

- Mathematics: As an integral part of the Scientific Process

Chapter 3: Biodiversity

3.1: Basis of Classification of Living Organisms

- Taxonomic Hierarchy

3.2: Historical Background of Aims and Principles of Classification

- Aims and Basis of Classification

3.3: Aristotle (Founder of Biological Classification)

- Two Kingdom Classification System

3.4: The Five Kingdoms

- Five Kingdom System
- More on Five Kingdom Classification System

3.5: Structure of Viruses

- Structure of Bacteriophage
- Status of Viruses

3.6: Historical Background, Aims, and Principles of Binomial Nomenclature

- Binomial Nomenclature

3.7: Conservation of Biodiversity

- Endangered Species

3.8: Deforestation

- Deforestation, Soil Erosion

Chapter 4: Cells and Tissues

4.1: Microscopy

- Light Microscope
- Electron Microscope
- Working of SEM
- Working of TEM
- Comparison of Different Types of Microscope

4.2: History of the Formulation of Cell Theory

- History of Formulation of Cell Theory

4.3: Acellular Particles

- Prions
- Viruses, Size, Shape and Characteristics

4.4: Structure and Functions of Cell

- Cell
- Cell wall
- More on the Cell wall
- Cell Membrane
- Cytoplasm, Cytoskeleton
- Nucleus
- Endoplasmic Reticulum (ER), Ribosomes
- Golgi Apparatus and Lysosomes
- Mitochondria

- Centrioles
- Plastids
- Vacuoles

4.5: Structure of Leaf and Functions of Constituents Cells

- Internal Structure of Leaf

4.6: Significance of Cell Wall and Chloroplast

- Chloroplasts, The Sites of Photosynthesis

4.7: Relationship Between Cell Function and Cell Structure

- Relationship b/w Cell Structure and Function

4.8: Difference Between Prokaryotic and Eukaryotic Cell

- Difference between Prokaryotic and Eukaryotic Cells

4.9: Passive and Active Transport of Molecules Across The Cell Membrane

- Diffusion, Facilitated Diffusion
- Osmosis
- Filtrations and Active Transport
- Endocytosis and Exocytosis

4.10: Comparison of Passive and Active Transport

- Passive Transport and Active Transport

4.11: Turgor Pressure

- Turgor

4.12: Plasmolysis

- Plasmolysis

4.13: Role of Cell Membrane in Maintaining Equilibrium While Exchanging Matters

4.14: Tissues

- Tissues and Organs
- Plant tissues, Simple and Compound Tissues

4.15: Animal Tissues

- Animals and Plant Tissues
- Epithelial Tissue
- Connective Tissues, Nervous Tissues

- Muscle Tissues

4.16: Plant Tissues

- Plant tissues, Simple and Compound Tissues
- Meristematic Tissues
- Permanent Tissues
- More on Permanent Tissues
- Compound Tissues

Chapter 5: Cell Cycle

5.1: Cell Cycle

5.2: Phases of the Cell Cycle

- G1 Phase, S Phase

5.3: Mitosis

- Mitosis, Karyokinesis, Cytokinesis, Prophase
- More on Mitosis 1, Metaphase, Anaphase, Telophase
- More on Mitosis 2, Cytokinesis

5.4: Significance of Mitosis

- Significance of Mitosis

5.5: Meiosis

- Phases of Meiosis
- Meiosis-I, Prophase I
- More on Meiosis-I, Prophase I
- Metaphase I, Anaphase I and Telophase I
- Meiosis-II

5.6: Significance of Meiosis

- Significance of Meiosis

5.7: Necrosis and Apoptosis

- Apoptosis and Necrosis

Chapter 6: Enzymes

6.1: Role of Enzymes in Metabolism

- Enzyme

6.2: Characteristics of Enzymes

- Characteristics of Enzymes

6.3: Co-factors

- Types of Cofactors

6.4: Factors Affecting the Rate of Enzyme Action

- Factors Affecting the Rate of Enzyme Action

6.5: Mechanism of Enzyme Action

- Mechanism of Enzymes

6.6: Specificity of Enzymes

- Specificity of Enzymes

Chapter 7: Bioenergetics

7.1: Bioenergetics

- Basic Introduction

7.2: Oxidation-Reduction Reactions

- Oxidation-Reduction Reaction

7.3: ATP-The Energy Currency of Cell

- Role of ATP as Energy Currency

7.4: ATP-ADP Cycle

- ATP The Cell's Energy Currency

7.5: Photosynthesis

- Most of the Life forms are dependent on Photosynthesis

7.6: Intake of Water and CO₂

- Water and Photosynthesis

- Role of Carbon Dioxide and Water in Photosynthesis

7.7: Role of Chlorophyll in Trade of Light Energy

- Role of Chlorophyll and Light

7.8: Process Involved in Photosynthesis

- Light Reaction
- Dark Reaction

7.9: Limiting Factors for Photosynthesis

- Limiting Factors in Photosynthesis

7.10: Respiration

- Respiration
- Aerobic Respiration
- Types of Anaerobic Respiration (Fermentation)
- Types of Fermentation
- Importance of Fermentation

7.11: Mechanism of Aerobic Respiration

- Glycolysis
- Krebs cycle
- Electron Transport Chain

7.12: Energy Budget of Respiration

- The Energy Budget of Respiration

7.13: Comparison of Photosynthesis and Respiration

- Comparison of Photosynthesis and Respiration

7.14: Comparison Between Aerobic and Anaerobic Respiration

- Comparison of Aerobic and Anaerobic Respiration

Chapter 8: Nutrition

8.1: Mineral Nutrition in Plants

- Autotrophic and Heterotrophic Nutrition
- Minerals Requirement in Plants
- Macronutrients, Micronutrients

8.2: Role of Nitrogen in Protein Synthesis

- Role of Nitrogen and Magnesium

8.3: Role of Magnesium in Chlorophyll Formation

- Minerals Requirement, Magnesium

8.4: Effect of Lack of Nitrate and Magnesium ion in Plant Growth

- Minerals Requirement, Nitrogen

8.5: Environmental Hazards Related to Chemical Fertilizers Use

8.6: Components of Human Food

- Carbohydrates
- Functions of Carbohydrates
- Structure of Amino Acid
- Function of Protein
- Lipids Characteristics
- Vitamins
- Vitamin C and D
- Role of Calcium and Iron
- Water and Dietary Fibre

8.7: Problems Related to Nutrition

- Protein-Energy Malnutrition
- Mineral Deficiency Diseases
- Over-intake of Nutrients
- Effects of Malnutrition

8.8: Digestive System and Digestion of Food in Man

- Digestion in Human

8.9: Alimentary Canal/Digestive Tract

- Alimentary Canal
- Oral Cavity
- Pharynx and Oesophagus
- Stomach Digestion
- Small intestine
- More on the Small intestine
- Large intestine

- 8.10: Role of Pancreas in Digestion
- Enzymes

8.11: Role of Liver in The Metabolism of Glucose

- Role of Liver
- Deamination, Urea, Uric Acid

8.12: Digestive Disorder or Disorder of Gut

- Diarrhea, Vomiting
- Constipation, Ulcer

Chapter 9: Transport

9.1: Transport and It's Needs

- The need for Transport of Materials

9.2: Transport in Plants

- Transport in Plants
- Absorption by Roots
- Uptake of water by Roots and Pathways

9.3: Transpiration

- Transpiration
- Opening and Closing of Stomata
- Mechanism of Stomatal Transpiration
- Factors Affecting the Rate of Transpiration
- Significance of Transpiration
- Transpiration is Necessary Evil

9.4: Transport of Water in Stem

- Cohesion and Tension Theory
- Transpiration Pull

9.5: Translocation of Food in Plants

- Source- Sink Movement
- Transport of Food

9.6: Transport in Man

- Functions of Blood
- Blood, Blood Plasma
- Blood Cells
- White Blood Cells
- Platelets
- ABO Blood Group System
- Rh Blood Group System
- Leukaemia
- Thalassaemia

9.7: Human Heart

- Structure of the Human Heart
- Valves of Heart
- Passage of Blood Through Heart
- Pulmonary and Systemic Circulation
- Cardiac Cycle
- HeartBeat and Pulse Rate
- Blood Vessels, Arteries
- Capillaries, Veins
- Comparison of Arteries, Capillaries, and Veins
- Stomatal Transpiration
- Arterial System
- Venous System
- More on Atherosclerosis
- Arteriolosclerosis
- Atherosclerosis and Arteriosclerosis

Chapter 10: Gaseous Exchange

10.1: Gaseous Exchange in Plants

- Cellular Respiration, Gaseous Exchange and Breathing
- Gaseous Exchange in Plants

10.2: Gaseous Exchange in Humans

- The Air Passageway
- The Lungs
- The Mechanism of Breathing

10.3: Respiratory Disorders (4 videos)

- Bronchitis, Emphysema
- Pneumonia, Asthma
- Lung Cancer
- Bad Effects of Smoking

Chapter 11: Homeostasis

11.1: Homeostasis in Plants

- Osmoregulation, Thermoregulation and Excretion
- Removal of Extra Carbon dioxide and Oxygen, Extra Water
- Removal of Other Metabolic Wastes
- Osmotic Adjustments in Plants

11.2: Homeostasis in Humans

- Skin and Lungs

11.3: Urinary System of Human

- Structure of Kidney
- Function of Kidney
- Kidney as Osmoregulatory Organ

11.4: Disorders of Kidney

- Kidney Stones
- Kidney (Renal) Failure, Dialysis
- Kidney Transplant

Chapter 12: Coordination and Control

12.1: Types of Coordination

- Stimuli, Receptors, Effectors, Response
- Coordinated Action, Stimuli, Receptors
- Coordinators and Effectors, Response

12.2: Human Nervous System

- Nerve Cell or Neuron
- Neuron Types

- Nerve Types
- Components of Nervous System, Brain
- The Divisions of Brain, Forebrain
- More on Forebrain
- Midbrain and Hindbrain
- Spinal Cord
- More on Spinal Cord
- Peripheral Nervous System
- More on PNS (Peripheral Nervous System)
- Reflex Arc

12.3: Receptors in Humans

- Eye
- More on Eye
- Process of Image Formation
- Disorders of Eye
- Muslim Scientist (Eye)
- Ear, External Ear
- Middle Ear, Inner Ear
- Hearing, Balancing, Defects of Hearing

12.4: Endocrine System

- Important Endocrine Glands
- Pituitary Gland
- Thyroid Gland
- Parathyroid Glands
- Adrenal Glands
- Pancreas
- Gonads
- Feedback Mechanisms

12.5: Disorders of Nervous System

- Paralysis and Epilepsy

Chapter 13: Support and Movement

13.1: Human Skeleton

- Skeleton, Endoskeleton, Exoskeleton, Hydroskeleton

- Role of Skeletal System
- Bones
- Cartilages
- Human Skeleton, Axial Skeleton
- Appendicular Skeleton

13.2: Types of Joints

- Types of Joints
- Roles of Tendons and Ligaments

13.3: Muscles and Movements

- Muscles and Movements

13.4: Disorders of the Skeletal System

- Arthritis and its Types
- Osteoporosis

Chapter 14: Reproduction

14.1: Reproduction

- Reproduction, Asexual and Sexual Reproduction

14.2: Methods of Asexual Reproduction

- Binary Fission
- Multiple Fission
- Fragmentation, Budding
- Spore Formation
- Parthenogenesis, Vegetative Propagation
- Natural Vegetative Propagation
- More on Natural Vegetative Propagation
- Artificial Vegetative Propagation
- Advantages and Disadvantages of Vegetative Propagation of Plants
- Tissue Culturing and Cloning

14.3: Sexual Reproduction in Plants

- Alternation of Generations
- Sexual Reproduction in Flowering Plants
- More Sexual Reproduction in Flowering Plants
- Life Cycle of Flowering Plants

- Pollination
- Adaptations in Insect-Pollinated and wind-pollinated Flowers
- Development and Structure of Seed
- Germination of Seed
- Conditions Necessary for Seed Germination

14.4: Sexual Reproduction in Animals

- Gametogenesis
- Mating and Fertilization
- Mating and Fertilization
- Male Reproductive System, (Rabbit)
- Female Reproductive System, (Rabbit)
- AIDS, A Sexually Transmitted Disease

Chapter 15: Inheritance

15.1: Introduction to Genetics

- Genes, Locus, Alleles, Phenotype, Genotype

15.2: Chromosomes and Genes

- Gene and Genome, Chromosome, Chromatin
- Watson-Crick model of DNA
- How Does the DNA of Chromosome work?
- Replication of DNA
- Transcription
- Translation

15.3: Mendel Law of Inheritance

- Mendel's Law of Segregation
- Mendel's Law of Independent Assortment
- Punnett Square, Test Cross
- Punnett Square

15.4: Co-Dominance and Incomplete Dominance

- Co-Dominance
- Incomplete Dominance

15.5: Variations and Evolution

- Sources of variations

- Discontinuous and Continuous Variations
- Variations Lead to Evolution
- Theory of Natural Selection
- Artificial Selection

Chapter 16: Man and His Environment

16.1: Levels of Ecological Organization

- Ecology, Community, Population, Ecosystems, Biosphere
- Components of Ecosystem

16.2: Flow of Materials and Energy in Ecosyst

- Flow of Energy
- Flow of Materials
- Ecological Pyramids
- Ecological Pyramids Biomass
- Ecological Pyramids Number
- Biogeochemical Cycles, Carbon Cycle
- Nitrogen Cycle, Formation of Nitrates
- Assimilation and Denitrification

16.3: Interactions in Ecosystems

- Predation
- Symbiosis
- More on Symbiosis

16.4: Ecosystem Balance and Human Impact

- Global Warming
- Acid Rain
- Deforestation, Soil Erosion
- Overpopulation, Urbanization

16.5: Pollution; Consequences and Control

- Air Pollution
- Water Pollution
- Land Pollution

16.6: Conservation Of Nature

- 3 R, Reduce, Reuse and Recycle

- Basic Information about Dengue Fever

Chapter 17: Biotechnology

17.1: Introduction of Biotechnology

- Genetic engineering
- Scope and Importance of Biotechnology

17.2: Fermentation

- Fermentation
- Alcoholic Fermentation (by Yeast)
- Lactic Acid Fermentation (by Bacteria)
- Fermentation Products
- Fermenter

17.3: Genetic Engineering

- Objectives and Basic Steps of Genetic Engineering
- Achievements of Genetic Engineering

17.4: Single-Cell Protein

- Single-Cell Protein

Chapter 18: Pharmacology

18.1: Medicinal Drugs

- Drug, Pharmaceutical Drug, Addictive Drugs
- Synthetic Drugs, Drugs from Plants and Fungi
- Drugs from Animals, Minerals and Bacteria
- Principle Usage of Important Medicinal Drugs

18.2: Addictive Drugs

- Sedatives, Narcotics
- Hallucinogens, Marijuana (Hashish)
- Drug Addiction and Associated Problems

18.3: Antibiotics and Vaccines

- Antibiotics, Bactericidal and Bacteriostatic Antibiotics

- Three major groups of antibiotics, Antibiotic Resistance
- Vaccines, The Mode of Action of Vaccines