

# Triple Biology

## Biology Paper 1

### Cell Biology:

Cells
Microscopy
Cell differentiation and specialisation
Chromosomes and mitosis
Binary Fission
Culturing Microorganisms
Stem cells
Diffusion
Osmosis
Active transport
Exchange surfaces
Exchange substances

### Organisation

Cell organisation
Enzymes and enzymatic reactions
Enzymes and digestion
Food tests
Lungs
The heart
Blood vessels
Blood
Cardiovascular disease
Health and disease
Risk factors for non-communicable diseases
Cancer
Plant cell organisation
Transpiration and translocation
Transpiration and stomata

### Infection and response

Communicable diseases
Viral, fungal and protist diseases
Bacterial disease and prevention
Fighting disease
Fighting diseases - vaccination
Fighting diseases - Dugs
Developing drugs
Monoclonal Antibodies
Plant Diseases and Defences

### Bioenergetics

Photosynthesis and limiting factors
The rate of photosynthesis
Respiration and metabolism
Aerobic and anaerobic respiration
Exercise

## Biology Paper 2

### Homeostasis and Response

Homeostasis
The nervous system

Synapses and reflexes
Investigating reaction time
The Brain
The Eye
Correcting Vision Defects
Controlling Body Temperature
Endocrine system
Controlling blood glucose (foundation-name of the hormone, role and where its produced)
The Kidneys
Puberty and the menstrual cycle
Controlling fertility
Adrenaline and Thyroxine
Plant Hormones
Commercial Uses of Plant Hormones

### Inheritance, Variation and Evolution

DNA
The Structure of DNA and Protein Synthesis
Mutations
Reproduction
X and Y Chromosomes
Meiosis
X and Y chromosome
Genetic diagrams
Inherited disorders, family trees and embryo screening
The Work of Mendel
Variation
Evolution
Selective Breeding
Genetic engineering
Cloning
Fossils
Speciation
Antibiotic resistance
Classification

### Ecology

Competition
Abiotic and Biotic factors
Food chains
Using quadrats and Transects
Water cycle
Carbon cycle
Decay and Investigating Decay
Biodiversity and waste management
Global warming
Deforestation and land
Maintaining ecosystems and biodiversity
Trophic Levels
Pyramids of Biomass
Biomass Transfer
Food Security and Farming
Biotechnology

# Chemistry Paper 1

## Atomic structure and the periodic table:

Atoms
Elements
Compounds
Chemical Equations
Mixtures and chromatography
More separation techniques
Distillation
History of the atom
Electronic structure
Development of the periodic table
The modern periodic table
Metals and non-metals
Group 1 elements
Group 7 elements
Group 0 elements

## Bonding, Structure and Properties of matter

Formation of ions
Ionic bonding
Ionic compounds
Covalent bonding
Simple molecular substances
Polymers and giant covalent structures
Allotropes of carbons
Metallic bonding
States of matter
Changing states
Nanoparticles
Uses of Nanoparticles

## Quantitative Chemistry

Relative formula mass
The Mole
Conservation of mass
The Mole Equations
Limiting Reactants
Gases and Solutions
Concentration Calculations
Atom Economy
Concentrations of solutions

## Chemical Changes

Acids and Bases
Titration
Strong Acids and Weak Acids
Reactions of acids
The reactivity series
Separating Metals from Metal Oxides
Redox Reactions
Electrolysis
Electrolysis of aqueous solutions

## Energy Changes

<u>Energy Changes</u>
Exothermic and endothermic reactions
Bond Energies
Cells and Batteries
Fuel Cells

# Chemistry Paper 2

## The Rate and Extent of chemical changes

Rates of reactions
Factors affecting rates of reactions
Measuring rates of reactions
Two Rates Experiments
Finding reaction rates from graphs
Reversible reactions
Le Chatelier's Principle

## Organic Chemistry

Hydrocarbons
Fractional Distillation
Uses and Cracking of Crude oil
Alkenes
Reactions of Alkenes
Addition Polymers
Alcohols
Carboxylic Acids
Condensation Polymers
Naturally Occurring Polymers

## Chemical Analysis

Purity and Formulations
Paper Chromatography
Test for gases and Anions
Tests for cations

## Chemistry of the Atmosphere

The evolution of the Atmosphere
Greenhouse gases and Climate Change
Carbon Footprints
Air Pollution

## Using Resources

Ceramics, composites and Polymers
Properties of Materials
Corrosion
Finite and renewable Resources
Reuse and Recycling
Using Life Cycle Assessment
Potable Water
Waste Water Treatment
The Haber Process
NPK Fertilisers

# Physics Paper 1

## Energy

Energy stores and systems
Kinetic and potential energy stores
Specific heat capacity
Conservation of energy and power
Conduction and Convection
Reducing unwanted energy transfers
Efficiency
Energy resources and their uses
Wind, solar and geothermal
Hydroelectricity, waves and tides
Bio-fuels and non-renewables
Trends in energy resource use

## Electricity

Current and circuit symbols
Resistance and $V=IR$
Resistance and I-V characteristics
Circuit devices
Series circuit
Parallel circuit
Investigating resistance
Electricity in the home
Power of electrical appliances
More on Power
The national grid
Static Electricity
Electric Fields

## Particle Model of Matter

The particle model and motion in gases
Density
Internal energy and changes of state
Specific latent heat
Particle Motion in Gases

## Atomic Structure

Developing the model of the atom
Isotopes and nuclear radiation
Nuclear equations
Half-life
Background Radiation and Contamination
Uses and Risks
Fission and Fusion

# Physics Paper 2

## Forces

Contact and Non-Contact Forces
Weight, mass and Gravity
Resultant Forces and Work Done
Calculating Forces
Forces and Elasticity
Investigating Springs
Moments
Fluid Pressure
Upthrust and Atmospheric Pressure
Distance, Displacement, speed and velocity
Acceleration
Terminal Velocity
Newton's First and Second Laws
Inertia and Newton's Third Law
Investigating Motion
Stopping Distances
Reaction Times
Momentum and Changes in Momentum
Distance-Time and Velocity Graphs

## Waves

Transverse and Longitudinal waves
Experiments with Waves
Reflection
Electromagnetic Waves and Refraction
Investigating Light
Radio waves
Electromagnetic Waves and Their Uses
Dangers of Electromagnetic Waves
Lenses
Images and Ray Diagrams
Concave Lenses and Magnification
Visible Light
Infrared Radiation and Temperature
Black Body Radiation
Sound Waves
Ultrasound
Exploring Structures using Waves

## Magnetism and Electromagnetism

Permanent and Induced Magnets
Electromagnetism
The Motor Effect
Electric Motors and Loudspeakers
The Generator Effect
Generators and Microphones
Transformers

## Magnetism and Electromagnetism

The Life Cycle of Stars
The Solar System and Orbits
Red-Shift and the Big Bang