Biology Paper 1

Knowledge	Skills

B1 Core Concepts
    a) Cells & Microscopes
    b) Enzymes
    c) Osmosis, Diffusion & Active Transport
 	
B2 Cells & Control
    a) Mitosis
    b) Growth (Plants & Animals)
    c) Stem Cells
    d) Nervous System
    e) Synapses
    f) PET/PET Scans (Triple)
    g) Limitations of treating Nervous Diseases (Triple)
    h) Brain & Eye (Triple)
 	
B3 Genetics
    a) Meiosis
    b) DNA
    c) Inheritance
    d) Gene Mutations
    e) Variation
    f) Protein Synthesis (Triple)
    g) Sex-linked Disorders (Triple)
    h) Mendel's Work (Triple)
    i) Codominance / Multiple Alleles (Triple)
 	
B4 Natural Selection
    a) Human Evolution
    b) Darwin's Theory of Evolution
    c) Classification
    d) Selective Breeding
    e) Genetic Engineering
    f) Pentadactyl Limb (Triple)
    g) Tissue Culture (Triple)
    h) Darwin & Wallace's Work (Triple)
 	
B5 Health & Disease
    a) Communicable / Non-Communicable Diseases
    b) Cardiovascular Disease
    c) Physical & Chemical Defences
    d) Immune System
    e) Antibiotics
    f) Viruses (Triple)
    g) Plant Defences (Triple)
    h) Plant Diseases (Triple)
    i) Monoclonal Antibodies (Triple)
    j) Microbial Growth (Triple)
	1) Microscope Calculations
	2) Interpreting Graphs
	3) Percentage Change Calculations
	4) Calculating Rate
	5) Using Standard Form
	6) Unit Conversions
	7) Calculating Averages (Means)
	8) Genetic Cross Diagrams
	
	Required Practicals
	
	1. Investigating the effect of pH on enzyme activity
	
	2. Investigating how different concentrations of sugar (or salt) solution affect the mass of tissue (due to osmosis)
	
	3. Investigating the effect of antibiotics / antiseptics on bacterial growth
	
	4. Testing Foods (Triple)

Biology Paper 2

Knowledge	Skills

B1 Core Concepts
  d) Cells & Microscopes
  e) Enzymes
  f) Osmosis, Diffusion & Active Transport
 	
B6 Plant Structures & Their Function
  a) Photosynthesis & Lead Adaptations
  b) Absorbing water and mineral ions
  c) Transpiration (xylem function)
  d) Translocation (phloem function)
  e) Extreme Environments (Triple)
  f) Plant Growth Hormones (Triple)
 	
B7 Homeostasis
  a) Hormones
  b) Metabolic Rate
  c) Menstrual Cycle
  d) Controlling Blood-Glucose Levels
  e) Type 2 Diabetes
  f) Thermoregulation (Triple)
  g) Osmoregulation (Kidney & ADH) (Triple)
 	
B8 Exchange & Transport in Animals
  a) Gas Exchange Surfaces & Alveoli
  b) Circulatory System
  c) The Heart
  d) Respiration
  e) Fick's Law (Triple)
 	
B9 Ecosystems
  a) Abiotic & Biotic Factors
  b) Parasites & Mutualists
  c) Biodiversity
  d) Water Cycle
  e) Carbon Cycle
  f) Nitrogen Cycle
  g) Indicator Species (Triple)
  h) Food Security (Triple)
  i) Decomposition (Triple)
  j) Energy Loss & Efficiency (Triple)
	9) Microscope Calculations
	10) Interpreting Graphs
	11) Percentage Change Calculations
	12) Calculating Rate
	13) Using Standard Form
	14) Unit Conversions
	15) Calculating Averages (Means)
	16) Inverse Square Law

Required Practicals

5. Investigating the effect of light intensity on the rate of photosynthesis

6. Investigating factors that affect the rate of respiration in animals (e.g. woodlice)

7. Quadrats & Transects

Chemistry Paper 1

Knowledge	Skills

C1 States of Matter
   a) States of Matter
 	
C2 Separation Techniques
   a) Mixtures
   b) Filtration
   c) Crystallisation
   d) Chromatography
   e) Distillation
   f) Drinking Water
 	
C3 Atomic Structure (key content)
   a) Development of Atomic Structure
   b) Atomic Number and Mass
 	
C4 Periodic Table (key content)
   a) Elements and the Periodic Table
   b) Atomic Number and Electron Configuration
 	
C5-7 Bonding (key content)
   a) Ions and Ionic Bonding
   b) Ionic Lattices and Properties
   c) Covalent Bonding and Molecular Compounds
   d) Allotropes of Carbon
   e) Metallic Bonding
   f) Bonding Models
 	
C8 Acids
   a) Acids, Alkalis and Indicators
   b) Balancing Equations
   c) Neutralisation
   d) Solubility
 	
C9 Calculations Involving Masses (key content)
   a) Relative Formula Mass
   b) Empirical Formula
   c) Conservation of Mass
   d) Concentration
   e) Moles
   f) Limiting Reactants
 	
C10 Electrolysis
   a) Electrolysis
   b) Products of Electrolysis (molten and aqueous)
 	
C11 Obtaining Metals
   a) Reactivity Series and Ores
   b) Redox Reactions
   c) Lifecycle Assessments and Recycling
 	
C12 Reversible Reactions
   a) Reversible Reactions
   b) Dynamic Equilibrium
   c) **Haber Process (Triple)**
	a) Calculating using Formulae
	b) Rearranging Formulae
	c) Interpreting Graphs
	d) Using Standard Form
	e) Unit Conversions
	f) Writing balanced equations
	g) Calculating Numbers of Protons, Neutrons and Electrons
	h) Writing Electron Configurations
	i) Calculating Averages (Means)
	j) Calculating Relative Atomic Mass
	k) Calculating Empirical Formula
	l) Calculating Percentage by Mass
	m) Calculating Moles
	n) Calculating Maximum Mass
	o) Calculating Concentration
	p) Calculating Number of Molecules or Atoms
	
	Required Practicals
	
	1. Investigating composition of inks using distillation and chromatography
	
	2. Investigating change in pH of a fixed volume of HCl on the addition of calcium hydroxide
	
	3. Preparation of pure, dry hydrated copper sulfate crystals
	
	4. Investigating the electrolysis of copper sulfate solutions with inert (graphite) and copper electrodes
	
	5. **Acid-alkali titration (Triple)**

EXTRA TRIPLE UNITS
SC13 Transition Metals
    a) **Transition Metals**
    b) **Corrosion**
    c) **Electroplating**
    d) **Alloys**

SC14 Quantitative Chemistry
    a) **Yield and Atom Economy**
    b) **Molar Volumes of Gases**
    c) **Titrations to find unknown concentration**

SC16 Fuel Cells
    a) **Fuel Cells**

Chemistry Paper 2

Knowledge	Skills

C3 Atomic Structure **(key content)**
    c) Development of Atomic Structure
    d) Atomic Number and Mass
 	
C4 Periodic Table **(key content)**
    c) Elements and the Periodic Table
    d) Atomic Number and Electron Configuration
 	
C5-7 Bonding **(key content)**
    g) Ions and Ionic Bonding
    h) Ionic Lattices and Properties
    i) Covalent Bonding and Molecular Compounds
    j) Allotropes of Carbon
    k) Metallic Bonding
    l) Bonding Models
 	
C9 Calculations Involving Masses **(key content)**
    g) Relative Formula Mass
    h) Empirical Formula
    i) Conservation of Mass
    j) Concentration
    k) Moles
    l) Limiting Reactants
 	
C13 Groups of the Periodic Table
    a) Group 1 - Alkali Metals
    b) Group 7 - Halogens
    c) Group 0 - Noble Gases
 	
C14 Rates of Reaction
    a) Collision Theory
    b) Investigating Rates
C15 Energy Changes
    a) Exothermic and Endothermic Reactions
    b) Calculating Bond Energies
 	
C16 Fuels
    a) Hydrocarbons and Fractional Distillation
    b) Alkanes and Alkenes
    c) Combustion
 	
C17 Atmosphere
    a) Evolution of the Atmosphere
    b) Climate Change
 	
EXTRA TRIPLE UNITS
 	
SC22-24 Organic Chemistry
    a) Alkanes, Alkenes and Alcohols
    b) Carboxylic Acids
    c) Addition Polymers
    d) Condensation Polymers
    e) Problems with Polymers
 	
SC25 Testing for Ions
	a) Calculating using Formulae
	b) Rearranging Formulae
	c) Interpreting Graphs
	d) Using Standard Form
	e) Unit Conversions
	f) Writing balanced equations
	g) Calculating Numbers of Protons, Neutrons and Electrons
	h) Writing Electron Configurations
	i) Calculating Averages (Means)
	j) Calculating Relative Atomic Mass
	k) Calculating Empirical Formula
	l) Calculating Percentage by Mass
	m) Calculating Moles
	n) Calculating Maximum Mass
	o) Calculating Concentration
	p) Calculating Number of Molecules or Atoms
	q) Calculating Rates
	r) Calculating Energy Changes for Reactions
	<hr>**Required Practicals**
	
	6. Investigating the rate of a reaction by
	    a. Measuring production of a gas
	    b. Observing a colour change
	
	7. Identify the ions in unknown salts (Triple)
	
	8. Investigate the temperature rise of a known mass of water by common alcohols (Triple)

a) Flame Tests
b) Precipitate Tests
c) Testing for Negative Ions
d) Instrumental Analysis
 	
SC26 Properties of Matter
    a) Nanoparticles and Bulk
    b) Composite Materials	

Physics Paper 1

Knowledge	Skills

P1 Motion
    a) Vectors and Scalars
    b) Distance/time Graphs
    c) Acceleration
    d) Velocity/time Graphs
	1. Calculating using Formulae
	2. Rearranging Formulae
	3. Interpreting Graphs
	4. Using Standard Form
	5. Unit Conversions
	6. Calculating Averages (Means)

P2 Motion and Forces
    a) Resultant Forces
    b) Newton's Laws
    c) Mass and Weight
    d) Momentum
    e) Stopping Distances
    f) Crash Hazards
    g) Braking Distance and Energy (Triple)
	Required Practicals

P3 Conservation of Energy
    a) Energy Stores and Transfers
    b) Efficiency
    c) Keeping Warm - Heat Transfer
    d) Stored Energies - KE and GPE
    e) Energy Resources
	1. Investigating the effect of mass and force on acceleration
	
	2. Investigating how to determine wave speed in air and solids
	
	3. Investigating the effect of angle of incidence on angle of refraction through a glass block
	
	4. Investigating effect of colour of surface on heat emission and absorption (Triple)

P4 Waves
    a) Describing Waves
    b) Wave Speed
    c) Refraction
    d) Waves Crossing Boundaries (Triple)
    e) Ears and Hearing (Triple)
    f) Ultrasound and Infrasound (Triple)

P5 Light and the Electromagnetic Spectrum
    a) The Electromagnetic Spectrum
    b) Using Long and Short Wavelengths
    c) Dangers of EM radiation
    d) Ray Diagrams (Triple)
    e) Colour (Triple)
    f) Lenses (Triple)
    g) Radiation and Temperature (Triple)

P6 Radioactivity
    a) Atoms, Electrons and Orbits
    b) Background Radiation
    c) Types of Radiation
    d) Radioactive Decay
    e) Half Life
    f) Dangers of Radioactivity
    g) Using Radioactivity (Triple)
    h) Radioactivity in Medicine (Triple)
    i) Nuclear Fission and Fusion (Triple)

EXTRA TRIPLE UNITS
P7 Astronomy
    a) The Solar System
    b) Gravity and Orbits
    c) Life Cycles of Stars
    d) Red-shift
    e) Origin of the Universe (Triple)

Physics Paper 2

Knowledge	Skills

P1 Motion
  a) Vectors and Scalars
  b) Distance/time Graphs
  c) Acceleration
  d) Velocity/time Graphs
 	
P7 Energy - Forces Doing Work
  a) Work and Power
 	
P8 Forces and Their Effects
  a) Objects affecting each other
  b) Vector Diagrams
  c) Rotational Forces (Triple)
 	
P9 Electricity and Circuits
  a) Electric Circuits
  b) Current and Potential Difference
  c) Current, Charge and Energy
  d) Resistance
  e) Thermistors and LDRs
  f) Transferring Energy and Power
  g) Electrical Safety
 	
P10 Magnetism and the Motor Effect
  a) Magnets and Magnetic Fields
  b) Electromagnetism
  c) Magnetic Forces
 	
P11 Electromagnetic Induction
  a) Transformers and Energy
  b) Electromagnetic Induction (Triple)
  c) The National Grid (Triple)
 	
P12 Particle Model
  a) Particles and Density
  b) Energy and Changes of State
  c) Energy calculations - specific heat capacity and specific latent heat
  d) Gas Temperature and Pressure
  e) Gas Pressure and Volume (Triple)
 	
P13 Forces and Matter
  a) Bending and Stretching
  b) Extension and Energy Transfers
  c) Pressure in Fluids (Triple)
  d) Pressure and Upthrust (Triple)
 	
EXTRA TRIPLE UNITS
P11 Static Electricity
  7. Charges and Static Electricity
  8. Dangers and Uses of Static ELectricity
  9. Electric Fields
	1. Calculating using Formulae
	2. Rearranging Formulae
	3. Interpreting Graphs
	4. Using Standard Form
	5. Unit Conversions
	6. Calculating Averages (Means)
	
	Required Practicals
	
	5. Investigating the effect of potential difference on current in a range of electrical components
	
	6. Investigating how to determine the density of different materials
	
	7. Investigating how to determine specific heat capacity of a material
	
	8. Investigating the effect of force on extension of a spring