

## Cambridge IGCSE Sciences - Co-ordinated (Double) 0654 Syllabus Breakdown & Weekly Lesson Plan

**Important Note:** This is a **Double Award** qualification covering Biology, Chemistry, and Physics, earning two grades (A\*-A\* to G-G). The content is divided into three equal sections: Biology (B1-B19), Chemistry (C1-C12), and Physics (P1-P6).

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### Assessment Structure (Extended Tier: A-G)\*

#### Compulsory Papers :

- **Paper 2:** Multiple Choice (Extended), 45 min, 40 marks, **30% weighting**
- **Paper 4:** Theory (Extended), 2 hours, 120 marks, **50% weighting**
- **Paper 5 or 6:** Practical or Alternative to Practical, 2h or 1.5h, 60 marks, **20% weighting**

#### Assessment Objectives :

- **AO1 Knowledge with understanding:** 50%
  - **AO2 Handling information and problem-solving:** 30%
  - **AO3 Experimental skills and investigations:** 20%
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### Topic Weightings & Time Allocation

Science Area	Topics	Weighting	Weeks Allocated
Physics (P1-P6)	6 topics	~33%	5.5 weeks
Chemistry (C1-C12)	12 topics	~33%	5 weeks
Biology (B1-B19)	19 topics	~33%	5.5 weeks
Practical Skills & Revision	Integrated	-	2 weeks

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### Detailed 16-Week Lesson Plan

#### WEEK 1-2: PHYSICS - MOTION, FORCES & ENERGY (P1)

##### Week 1: Kinematics & Forces

- Day 1: Physical quantities, measurement techniques, scalars vs vectors, speed vs velocity

- Day 2: Distance-time & speed-time graphs, calculating gradients and area under curves
- Day 3: Acceleration, motion equations, Newton's First and Second Laws ( $F=ma$ )
- Day 4: Past paper practice: Motion calculations (Paper 2)
- Day 5: **Practical**: Investigating motion using ticker tape or light gates
- Day 6: Past paper review: Graph interpretation and error analysis

### **Week 2: Energy, Work, Power & Forces**

- Day 1: Energy stores (kinetic, potential, chemical, thermal), conservation of energy, Sankey diagrams
- Day 2: Work done, power, efficiency calculations, energy resources
- Day 3: Forces, friction, air resistance, Newton's Third Law, momentum, impulse
- Day 4: Past paper practice: Energy and force problems (Paper 4)
- Day 5: **Practical**: Investigating energy efficiency or Hooke's Law ( $F=kx$ )
- Day 6: Past paper review: Force diagrams and energy calculations

### **WEEK 3: PHYSICS - THERMAL PHYSICS & WAVES (P2-P3)**

#### **Week 3: Thermal Physics & Waves**

- Day 1: Kinetic particle theory, states of matter, thermal expansion, conduction/convection/radiation
- Day 2: Specific heat capacity, latent heat, pressure in gases, evaporation
- Day 3: Wave properties, electromagnetic spectrum, applications and dangers
- Day 4: Past paper practice: Thermal physics calculations
- Day 5: **Practical**: Measuring specific heat capacity or investigating wave properties
- Day 6: Past paper review: Wave equation ( $v=f\lambda$ ) applications

### **WEEK 4: PHYSICS - LIGHT, SOUND & ELECTRICITY (P3-P4)**

#### **Week 4: Light, Sound & Electricity**

- Day 1: Light - reflection, refraction, total internal reflection, lenses, ray diagrams
- Day 2: Sound - properties, speed, ultrasound applications, hearing range

- Day 3: Electricity - current, voltage, resistance, Ohm's Law, series/parallel circuits
  - Day 4: Past paper practice: Optics and electricity questions (Paper 4)
  - Day 5: **Practical**: Investigating refraction or I-V characteristics
  - Day 6: Past paper review: Circuit analysis and lens calculations
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## **WEEK 5: PHYSICS - MAGNETISM, NUCLEAR & SPACE (P4-P6)**

### **Week 5: Magnetism, Nuclear Physics & Space**

- Day 1: Magnetism, electromagnets, electromagnetic induction, generators
  - Day 2: Nuclear physics - atomic structure, radioactivity, half-life, safety precautions
  - Day 3: Space physics - Solar System, stars, life cycle, galaxies, Big Bang theory
  - Day 4: Past paper practice: Electromagnetism and nuclear questions
  - Day 5: **Practical**: Simulating radioactive decay or analyzing astronomical data
  - Day 6: Past paper review: Half-life graph interpretation
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## **WEEK 6-8: CHEMISTRY - FUNDAMENTALS & STRUCTURE (C1-C4)**

### **Week 6: Particulate Nature & Atoms**

- Day 1: States of matter, particle theory, diffusion, changes of state
- Day 2: Elements, compounds, mixtures, separation techniques (filtration, distillation, chromatography)
- Day 3: Atomic structure, isotopes, electron arrangement, periodic trends
- Day 4: Past paper practice: Particle theory questions (Paper 2)
- Day 5: **Practical**: Paper chromatography or simple distillation
- Day 6: Past paper review: Separation method selection

### **Week 7: Bonding & Stoichiometry**

- Day 1: Ionic, covalent, metallic bonding, structure-property relationships
- Day 2: Moles, molar mass, formulas, percentage composition, limiting reactants
- Day 3: Electrolysis, products at electrodes, applications (hydrogen-oxygen fuel cells)
- Day 4: Past paper practice: Bonding and mole calculations (Paper 4)

- Day 5: **Practical:** Electrolysis of aqueous solutions
- Day 6: Past paper review: Ionic equation writing

### **Week 8: Energy & Chemical Reactions**

- Day 1: Energy changes, exothermic/endothermic reactions, activation energy diagrams
  - Day 2: Rate of reaction, factors, collision theory, catalysts, redox reactions
  - Day 3: Chemical reactions - types, equations, balancing
  - Day 4: Past paper practice: Energy and rate questions
  - Day 5: **Practical:** Investigating temperature on reaction rate
  - Day 6: Past paper review: Rate graph analysis and catalyst explanations
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## **WEEK 9-10: CHEMISTRY - ACIDS, PERIODIC TABLE & METALS (C7-C10)**

### **Week 9: Acids, Bases & Periodic Table**

- Day 1: Acids, bases, salts, pH scale, neutralization, acid-base titrations
- Day 2: Periodic Table trends, groups, reactivity patterns, transition elements
- Day 3: Air and water, pollutants, climate change, acid rain
- Day 4: Past paper practice: Acid calculations and periodic trends
- Day 5: **Practical:** Titration technique or salt preparation
- Day 6: Past paper review: Salt formation and titration errors

### **Week 10: Metals & Organic Chemistry**

- Day 1: Metals - properties, extraction, reactivity series, corrosion, alloys
  - Day 2: Alkanes, alkenes, alcohols, polymers, organic reactions (addition, combustion)
  - Day 3: Experimental techniques - titration, chromatography, qualitative analysis
  - Day 4: Past paper practice: Metal extraction and organic questions
  - Day 5: **Practical:** Testing for unsaturation or polymer properties
  - Day 6: Past paper review: Organic reaction conditions and homologous series
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## **WEEK 11-12: BIOLOGY - CELLS, TRANSPORT & NUTRITION (B1-B7)**

### **Week 11: Cells & Transport**

- Day 1: Cell structure (plant, animal, bacterial), organelles, functions, specialisation
- Day 2: Diffusion, osmosis, active transport, surface area to volume ratio
- Day 3: Enzymes - action, specificity, factors affecting activity (temperature, pH)
- Day 4: Past paper practice: Cell structure and transport questions (Paper 2)
- Day 5: **Practical:** Investigating osmosis or enzyme activity
- Day 6: Past paper review: Osmosis vs active transport confusion

### **Week 12: Nutrition & Transport in Plants**

- Day 1: Plant nutrition - photosynthesis, leaf structure, factors affecting rate
  - Day 2: Human nutrition - balanced diet, digestive system, enzymes, absorption
  - Day 3: Transport in plants - xylem, phloem, transpiration, translocation
  - Day 4: Past paper practice: Photosynthesis and transport questions
  - Day 5: **Practical:** Testing for starch or investigating transpiration
  - Day 6: Past paper review: Photosynthesis equation and leaf adaptation errors
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## **WEEK 13-14: BIOLOGY - TRANSPORT, DISEASES & COORDINATION (B9-B13)**

### **Week 13: Transport in Animals & Diseases**

- Day 1: Circulatory system, heart structure, blood vessels, blood composition
- Day 2: Diseases and immunity - pathogens, transmission, immunity, vaccination
- Day 3: Gas exchange in humans - breathing system, alveoli, effects of exercise
- Day 4: Past paper practice: Circulatory system and disease questions
- Day 5: **Practical:** Investigating heart rate or lung function
- Day 6: Past paper review: Heart structure and immunity concepts

### **Week 14: Respiration, Coordination & Homeostasis**

- Day 1: Respiration - aerobic, anaerobic, oxygen debt, word and balanced equations
- Day 2: Coordination - nervous system, reflex arc, hormones, homeostasis
- Day 3: Sense organs, eye structure, accommodation, pupil reflex
- Day 4: Past paper practice: Respiration and coordination questions

- Day 5: **Practical**: Investigating reaction time or respiration rate
  - Day 6: Past paper review: Reflex arc diagram and hormone vs nerve differences
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## **WEEK 15: INHERITANCE, VARIATION & ECOSYSTEMS (B15-B19)**

### **Week 15: Inheritance, Variation & Human Impact**

- Day 1: Inheritance - chromosomes, genes, mitosis, meiosis, monohybrid inheritance (Punnett squares)
  - Day 2: Variation and selection - mutation, natural selection, selective breeding, adaptive features
  - Day 3: Human influences on ecosystems - conservation, pollution, habitat destruction, sustainability
  - Day 4: Past paper practice: Genetics problems and ecosystem questions
  - Day 5: **Practical**: Modeling inheritance or analyzing ecological data
  - Day 6: Past paper review: Punnett square errors and selection mechanisms
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## **WEEK 16: INTENSIVE PAST PAPER PRACTICE & EXAM PREPARATION**

### **Week 16: Mock Exams & Final Preparation**

- Day 1: **Full Paper 2 mock** (Multiple Choice, 45 min) + immediate review
  - Day 2: **Full Paper 4 mock** (Theory, 2h) + extended answer marking
  - Day 3: **Full Paper 6 mock** (Alternative to Practical, 1h 30m) + skills review
  - Day 4: Error analysis: Identify weak science areas from mocks
  - Day 5: Targeted revision of weakest 3 topics across all sciences
  - Day 6: Exam technique, time management, confidence building
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### **Past Paper Integration Strategy**

1. **Topic-wise practice**: After each sub-topic, assign 3-5 past paper questions from topic compilations
2. **Weekly mixed practice**: Every week includes one full paper section (Paper 2, 4, or 6)
3. **Practical skills**: Integrate Paper 6 style questions with every practical investigation

4. **Calculator vs non-calculator:** Alternate practice between Paper 2 (non-calculator) and Paper 4 (calculator) styles
5. **Cumulative testing:** Every 2 weeks, mixed questions from all sciences covered to date

**Key Resources:**

- **Syllabus:** Official 0654 syllabus for 2023-2024
- **Past papers:** Papers 2, 4, 6 from 2019-2024 series
- **Practical skills:** Cambridge Co-ordinated Science Practical Workbook
- **Calculator:** Scientific calculator required for Papers 4 and 6
- **Double award focus:** Remember students earn two grades - ensure balanced preparation across all three sciences

**Exam Tips:**

- **Time management:** Paper 4 is 2 hours with 120 marks (1 min per mark) - practice pacing
- **AO1 focus:** 50% of marks are for knowledge and understanding - memorize key definitions, equations, and processes
- **AO2 focus:** 30% for problem-solving - practice applying concepts to unfamiliar contexts and interpreting data
- **AO3 focus:** 20% for practical skills - master describing experimental methods, identifying variables, and evaluating results
- **Common pitfalls:** Confusing respiration with breathing, mixing up reaction types, misreading graph scales, forgetting units in calculations, confusing mitosis with meiosis