

| Paper | Section | Chapter | Topic | RP |
|--|--|---|---|---------|
| Paper 1 Paper 1 Paper 1 Paper 1 Paper 1 | 4.1 Cell Biology | 4.1.1 Cell structure | 4.1.1.1 Eukaryotes and prokaryotes | |
| | | | 4.1.1.2 Animal and plant cells | RP1 |
| | | | 4.1.1.3 Cell specialisation | |
| | | | 4.1.1.4 Cell differentiation | |
| | | | 4.1.1.5 Microscopy | |
| | | | 4.1.1.6 Culturing microorganisms | RP2 |
| | | 4.1.2 Cell division | 4.1.2.1 Chromosomes | |
| | | | 4.1.2.2 Mitosis and the cell cycle | |
| | | | 4.1.2.3 Stem cells | |
| | 4.1.3 Transport in cells | 4.1.3.1 Diffusion | | |
| | | 4.1.3.2 Osmosis | RP3 | |
| | | 4.1.3.3 Active transport | | |
| | 4.2 Organisation | 4.2.1 Principles of organisation | | |
| | | | | |
| | | 4.2.2 Animal tissues, organs and organ systems | 4.2.2.1 The human digestive system | RP4 & 5 |
| | | | 4.2.2.2 The heart and blood vessels | |
| | | | 4.2.2.3 Blood | |
| | | | 4.2.2.4 Coronary heart disease: a non-communicable disease | |
| | | | 4.2.2.5 Health issues | |
| | 4.2.2.6 The effect of lifestyle on some non-communicable diseases | | | |
| | 4.2.2.7 Cancer | | | |
| | 4.2.3 Plant tissues, organs and systems | 4.2.3.1 Plant tissues and organs | | |
| | | 4.2.3.2 Plant organ systems | | |
| | 4.3 Infection and response | 4.3.1 Communicable diseases | 4.3.1.1 Communicable (infectious) diseases | |
| | | | 4.3.1.2 Viral diseases | |
| | | | 4.3.1.3 Bacterial diseases | |
| | | | 4.3.1.4 Fungal diseases | |
| | | | 4.3.1.5 Protist diseases | |
| 4.3.1.6 Human defence systems | | | | |
| 4.3.1.7 Vaccination | | | | |
| 4.3.1.8 Antibiotics and painkillers | | | | |
| 4.3.1.9 Discovery and development of drugs | | | | |
| 4.3.2.1 Producing monoclonal antibodies (HT ONLY) | | | | |
| 4.3.2.2 Uses of monoclonal antibodies (HT ONLY) | | | | |
| 4.3.3 Plant disease | 4.3.3.1 Detection and identification of plant diseases | | | |
| | 4.3.3.2 Plant defence responses | | | |
| 4.4 Biogenetics | 4.4.1 Photosynthesis | 4.4.1.1 Photosynthetic reaction | | |
| | | 4.4.1.2 Rate of photosynthesis | RP6 | |
| | 4.4.1.3 Uses of glucose from photosynthesis | | | |
| 4.4.2 Respiration | 4.4.2.1 Aerobic and anaerobic respiration | | | |
| | 4.4.2.2 Response to exercise | | | |
| | 4.4.2.3 Metabolism | | | |
| Paper 2 Paper 2 Paper 2 Paper 2 Paper 2 | 4.5 Homeostasis and response | 4.5.1 Homeostasis | 4.5.1.1 Importance of homeostasis | |
| | | 4.5.2 The human nervous system | 4.5.2.1 Structure and function | RP7 |
| | | | 4.5.2.2 The brain | |
| | | | 4.5.2.3 The eye | |
| | | | 4.5.2.4 Control of body temperature | |
| | | 4.5.3 Hormonal coordination in humans | 4.5.3.1 Human endocrine system | |
| | | | 4.5.3.2 Control of blood glucose concentration | |
| | | | 4.5.3.3 Maintaining water and nitrogen balance in the body | |
| | 4.5.3.4 Hormones in human reproduction | | | |
| | 4.5.3.5 Contraception | | | |
| | 4.5.3.6 The use of hormones to treat infertility (HT ONLY!) | | | |
| | 4.5.3.7 Negative feedback (HT ONLY!) | | | |
| | 4.5.4 Plant hormones | 4.5.4.1 Control and coordination | RP8 | |
| | | 4.5.4.2 Uses of plant hormones (HT ONLY) | | |
| | 4.6 Inheritance, variation and evolution | 4.6.1 Reproduction | 4.6.1.1 Sexual and asexual reproduction | |
| 4.6.1.2 Meiosis | | | | |
| 4.6.1.3 Advantages and disadvantages of sexual and asexual reproduction | | | | |
| 4.6.1.4 DNA and the genome | | | | |
| | | 4.6.1.5 DNA structure | | |
| | | 4.6.1.6 Genetic inheritance | | |
| | | 4.6.1.7 Inherited disorders | | |
| | | 4.6.1.8 Sex determination | | |
| 4.6.2 Variation and evolution | | 4.6.2.1 Variation | | |
| | | 4.6.2.2 Evolution | | |
| | 4.6.2.3 Selective breeding | | | |
| | 4.6.2.4 Genetic engineering | | | |
| | 4.6.2.5 Cloning | | | |
| 4.6.3 The development of understanding of genetics and evolution | 4.6.3.1 Theory of evolution | | | |
| | 4.6.3.2 Speciation | | | |
| | 4.6.3.3 The understanding of genetics | | | |
| | 4.6.3.4 Evidence for evolution | | | |
| | 4.6.3.5 Fossils | | | |
| | 4.6.3.6 Extinction | | | |
| | 4.6.3.7 Resistant bacteria | | | |
| 4.6.4 Classification of living organisms | | | | |
| 4.7 Ecology | 4.7.1 Adaptations, interdependence and competition | 4.7.1.1 Communities | | |
| | | 4.7.1.2 Abiotic factors | | |
| | | 4.7.1.3 Biotic factors | | |
| | | 4.7.1.4 Adaptations | | |
| | 4.7.2 Organisation of an ecosystem | 4.7.2.1 Levels of organisation | RP9 | |
| | | 4.7.2.2 How materials are cycled | | |
| | | 4.7.2.3 Decomposition | RP10 | |
| | | 4.7.2.4 Impact of environmental change (HT ONLY) | | |
| | 4.7.3 Biodiversity and the effect of human interaction on ecosystems | 4.7.3.1 Biodiversity | | |
| | | 4.7.3.2 Waste management | | |
| 4.7.3.3 Land use | | | | |
| 4.7.3.4 Deforestation | | | | |
| 4.7.3.5 Global warming | | | | |
| 4.7.3.6 Maintaining biodiversity | | | | |
| 4.7.4 Trophic levels in an ecosystem | 4.7.4.1 Trophic levels | | | |
| | 4.7.4.2 Pyramids of biomass | | | |
| | 4.7.4.3 Transfer of biomass | | | |
| 4.7.5 Food production | 4.7.5.1 Factors affecting food security | | | |
| | 4.7.5.2 Farming techniques | | | |
| | 4.7.5.3 Sustainable fisheries | | | |
| | 4.7.5.4 Role of biotechnology | | | |

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| Paper | Section | Chapter | Topic (and sub topic) | RP | Revised | | |
|---|--|--|--|--|---|--|--|
| Paper 1 | 4.1 Energy | 4.1.1 Energy changes in a system, and the ways energy is stored before and after these changes | 4.1.1.1 Energy stores and systems | | | | |
| | | | 4.1.1.2 Changes in energy | | | | |
| | | | 4.1.1.3 Energy changes in systems | RP1 | | | |
| | | | 4.1.1.4 Power | | | | |
| | | 4.1.2 Conservation and dissipation of energy | 4.1.2.1 Energy transfers in a system | RP2 | | | |
| | | | 4.1.2.2 Efficiency | | | | |
| | 4.2 Electricity | 4.2.1 Current, potential difference and resistance | 4.2.1.1 Standard circuit diagram symbols | | | | |
| | | | 4.2.1.2 Electrical charge and current | | | | |
| | | | 4.2.1.3 Current, resistance and potential difference | RP3 | | | |
| | | | 4.2.1.4 Resistors | RP4 | | | |
| | | | 4.2.2 Series and parallel circuits | 4.2.3.1 Direct and alternating potential differences | | | |
| | | | | 4.2.3.2 Mains electricity | | | |
| | | | 4.2.3 Domestic uses and safety | 4.2.4.1 Power | | | |
| | | | | 4.2.4.2 Energy transfers in everyday appliances | | | |
| | | | 4.2.4 Energy transfers | 4.2.4.3 The National Grid | | | |
| | | | | 4.2.5 Static electricity | 4.2.5.1 Static charge | | |
| | 4.3 Particle model of matter | 4.3.1 Changes of state and the particle model | 4.3.1.1 Density of materials | | RP5 | | |
| | | | 4.3.1.2 Changes of state | | | | |
| | | | 4.3.2.1 Internal energy | | | | |
| | | | 4.3.2.2 Temperature changes in a system and specific heat capacity | | | | |
| | | | 4.3.2.3 Changes of heat and specific latent heat | | | | |
| | | | 4.3.3 Particle model and pressure | 4.3.3.1 Particle motion in gases | | | |
| | | | | 4.3.3.2 Pressure in gases | | | |
| | | | | 4.3.3.3 Increasing the pressure of a gas (HT) | | | |
| | | | 4.4 Atomic structure | 4.4.1 Atoms and isotopes | 4.4.1.1 The structure of an atom | | |
| | | | | | 4.4.1.2 Mass number, atomic number and isotopes | | |
| | 4.4.1.3 The development of the model of the atom | | | | | | |
| | 4.4.2 Atoms and nuclear radiation | 4.4.2.1 Radioactive decay and nuclear radiation | | | | | |
| | | 4.4.2.2 Nuclear equations | | | | | |
| | | 4.4.2.3 Half lives and the random nature of radioactive decay | | | | | |
| | | 4.4.2.4 Radioactive contamination | | | | | |
| | 4.4.3 Hazards and uses of radioactive emissions and of background radiation | 4.4.3.1 Background radiation | | | | | |
| | | 4.4.3.2 Different half lives of radioactive isotopes | | | | | |
| | | 4.4.3.3 Uses of nuclear radiation | | | | | |
| | 4.4.4 Nuclear fission and fusion | 4.4.4.1 Nuclear fission | | | | | |
| | | 4.4.4.2 Nuclear fusion | | | | | |
| | Paper 2 | 4.5 Forces | 4.5.1 Forces and their interactions | 4.5.1.1 Scalar and vector quantities | | | |
| | | | | 4.5.1.2 Contact and non-contact forces | | | |
| | | | | 4.5.1.3 Gravity | | | |
| | | | | 4.5.1.4 Resultant forces | | | |
| | | | 4.5.2 Work done and energy transfer | | | | |
| | | | 4.5.3 Forces and elasticity | | RP6 | | |
| 4.5.4 Moments, levers and gears | | | | | | | |
| | | | | | | | |
| 4.5.5 Pressure and pressure differences in fluids | | | 4.5.4.1 Pressure in a fluid | | | | |
| | | | 4.5.5.1.1 Pressure in a fluid 1 | | | | |
| | | | 4.5.5.1.2 Pressure in a fluid 2 (HT) | | | | |
| | | | 4.5.5.2 Atmospheric pressure | | | | |
| | | | 4.5.6.1 Describing motion along a line | 4.5.6.1.1 Distance and displacement | | | |
| | | | | 4.5.6.1.2 Speed | | | |
| | | 4.5.6.1.3 Velocity | | | | | |
| | | 4.5.6.1.4 The distance time relationship | | | | | |
| | | 4.5.6.1.5 Acceleration | | | | | |
| | | 4.5.6.2 Forces, accelerations and Newton's laws of motion | 4.5.6.2.1 Newton's first law | | | | |
| 4.5.6.2.2 Newton's second law | | | RP7 | | | | |
| 4.5.6.2.3 Newton's third law | | | | | | | |
| 4.5.6.3 Forces and braking | | | 4.5.6.3.1 Stopping distance | | | | |
| | | 4.5.6.3.2 Reaction time | | | | | |
| | | 4.5.6.3.3 Factors affecting braking distance 1 | | | | | |
| | | 4.5.6.3.4 Factors affecting braking distance 2 | | | | | |
| 4.5.7 Momentum (HT) | | 4.5.7.1 Momentum is a property of moving objects | | | | | |
| | | 4.5.7.2 Conservation of momentum | | | | | |
| | | 4.5.7.3 Changes in momentum | | | | | |
| 4.6 Waves | | 4.6.1 Waves in air, fluids and solids | 4.6.1.1 Transverse and longitudinal waves | | RP8 | | |
| | 4.6.1.2 Properties of waves | | | | | | |
| | 4.6.1.3 Reflection of waves | | | RP9 | | | |
| | 4.6.1.4 Sound waves (HT) | | | | | | |
| | 4.6.1.5 Wave for detection and exploration (HT) | | | | | | |
| | 4.6.2 Electromagnetic waves | 4.6.2.1 Types of electromagnetic waves | | | | | |
| | | 4.6.2.2 Properties of electromagnetic waves 1 | RP10 | | | | |
| | | 4.6.2.3 Properties of electromagnetic waves 2 | | | | | |
| | | 4.6.2.4 Uses and applications of electromagnetic waves | | | | | |
| | | 4.6.2.5 Lenses | | | | | |
| | 4.6.2.6 Visible light | | | | | | |
| | 4.6.3.1 Emission and absorption of IR radiation | | | | | | |
| | 4.6.3.2 Perfect black bodies and radiation | | | | | | |
| 4.7 Magnetism and electromagnetism | 4.7.1 Permanent and induced magnetism, magnetic forces and fields | 4.7.1.1 Poles of a magnet | | | | | |
| | | 4.7.1.2 Magnetic fields | | | | | |
| | 4.7.2 The motor effect | 4.7.2.1 Electromagnetism | | | | | |
| | | 4.7.2.2 Fleming's left hand rule (HT) | | | | | |
| | | 4.7.2.3 Electric motors (HT) | | | | | |
| | | 4.7.2.4 Loudspeakers (HT) | | | | | |
| | 4.7.3 Induced potential, transformers and the National Grid (HT) | 4.7.3.1 Induced potential (HT) | | | | | |
| | | 4.7.3.2 Uses of the generator effect (HT) | | | | | |
| | | 4.7.3.3 Microphones (HT) | | | | | |
| | | 4.7.3.4 Transformers (HT) | | | | | |
| 4.8 Space physics | 4.8.1 Solar system; stability of orbital motions; satellites | 4.8.1.1 Our solar system | | | | | |
| | | 4.8.1.2 The life cycle of a star | | | | | |
| | | 4.8.1.3 Orbital motion, natural and artificial satellites | | | | | |
| | 4.8.2 Red shift | | | | | | |

NB. Separate physics content is written in **bold and italic**

Required Practicals for Separate Sciences

| Subject | RP# | Spec. ref | Summary |
|-------------------------|-----|-----------|--|
| 8461 - Biology | 1 | 4.1.1.2 | MICROSCOPY - Use a light microscope to observe, draw and label a selection of plant and animal cells. A magnification scale must be included. |
| | 2 | 4.1.1.6 | CULTURING MICROORGANISMS - Investigate the effect of antiseptics or antibiotics on bacterial growth using agar plates and measuring zones of inhibition. |
| | 3 | 4.1.3.2 | OSMOSIS - Investigate the effect of a range of concentrations of salt or sugar solutions on the mass of plant tissue. |
| | 4 | 4.2.2.1 | FOOD TESTS - Qualitative reagents to test for a range of carbohydrates, lipids and proteins. |
| | 5 | 4.2.2.1 | ENZYMES - Investigate the effect of pH on the rate of reaction of amylase enzyme. |
| | 6 | 4.4.1.2 | PHOTOSYNTHESIS - Investigate the effect of light intensity on the rate of photosynthesis using an aquatic organism such as pondweed. |
| | 7 | 4.5.2 | REACTION TIME - Plan and carry out an investigation into the effect of a factor on human reaction time. |
| | 8 | 4.5.4.1 | TROPISMS - Investigate the effect of light or gravity on the growth of newly germinated seedlings. |
| | 9 | 4.7.2.1 | SAMPLING - Measure the population size of a common species in a habitat. Use sampling techniques to investigate the effect of a factor on the distribution of this species |
| | 10 | 4.7.2.3 | DECOMPOSITION - Investigate the effect of temperature on the rate of decay of fresh milk by measuring pH change. |
| 8462 - Chemistry | 1 | 4.4.2.3 | SOLUBLE SALTS - Preparation of a pure, dry sample of a soluble salt from an insoluble oxide or carbonate, using a Bunsen burner to heat dilute acid and a water bath or electric heater to evaporate the solution. |
| | 2 | 4.4.2.5 | TITRATION - Determination of the reacting volumes of solutions of a strong acid and a strong alkali by titration. Determination of the concentration of one of the solutions in mol/dm ³ and g/dm ³ from the reacting volumes and the known concentration of the other solution (HT). |
| | 3 | 4.4.3.4 | ELECTROLYSIS - Investigate what happens when aqueous solutions are electrolysed using inert electrodes. This should be an investigation involving developing a hypothesis. |
| | 4 | 4.5.1.1 | TEMPERATURE CHANGE - Investigate the variables that affect temperature changes in reacting solutions such as, eg acid plus metals, acid plus carbonates, neutralisations, displacement of metals. |
| | 5 | 4.6.1.2 | RATES OF REACTION - Investigate how changes in concentration affect the rates of reactions by a method involving measuring the volume of a gas produced and a method involving a change in colour or turbidity. |
| | 6 | 4.8.1.3 | CHROMATOGRAPHY - Investigate how paper chromatography can be used to separate and tell the difference between coloured substances. Students should calculate R _f values. |
| | 7 | 4.8.3 | CHEMICAL ANALYSIS - Use of chemical tests to identify the ions in unknown single ionic compounds covering the ions from Flame tests to Sulfates. |
| | 8 | 4.10.1.2 | POTABLE WATER - Analysis and purification of water samples from different sources, including pH, dissolved solids and distillation. |
| 8463 - Physics | 1 | 4.1.1.3 | SPECIFIC HEAT CAPACITY - An investigation to determine the specific heat capacity of one or more materials. The investigation will involve linking the decrease of one energy store (or work done) to the increase in temperature and subsequent increase in thermal energy stored. |
| | 2 | 4.1.2.1 | ENERGEY TRANSFERS - Investigate the effectiveness of different materials as thermal insulators and the factors that may affect the thermal insulation properties of a material. |
| | 3 | 4.2.1.3 | RESISTANCE - Use circuit diagrams to set up and check appropriate circuits to investigate the factors affecting the resistance of electrical circuits. |
| | 4 | 4.2.1.4 | I-V CHARACTERISTICS - Use circuit diagrams to construct appropriate circuits to investigate the I-V characteristics of a variety of circuit elements, including a filament lamp, a diode and a resistor at constant temperature. |
| | 5 | 4.3.1.1 | DENSITY - Use appropriate apparatus to make and record the measurements needed to determine the densities of regular and irregular solid objects and liquids. Volume should be determined from the dimensions of regularly shaped objects, and by a displacement technique for irregularly shaped objects. Dimensions to be measured using appropriate apparatus such as a ruler, micrometer or Vernier callipers. |
| | 6 | 4.5.3 | SPRING CONSTANT - Investigate the relationship between force and extension for a spring. |
| | 7 | 4.5.4.2.2 | ACCELERATION - Investigate the effect of varying the force on the acceleration of an object of constant mass, and the effect of varying the mass of an object on the acceleration produced by a constant force. |
| | 8 | 4.6.1.2 | WAVES - Make observations to identify the suitability of apparatus to measure the frequency, wavelength and speed of waves in a ripple tank and waves in a solid and take appropriate measurements. |
| | 9 | 4.6.1.3 | REFLECTION OF WAVES - Investigate the reflection of light by different types of surface and the refraction of light by different substances. |
| | 10 | 4.6.2.2 | I.R. RADIATION - Investigate how the amount of infrared radiation absorbed or radiated by a surface depends on the nature of that surface. |