SCIENCE YEAR 7 KS3

KS3 (Year 7-9) CURRICULUM NARATIVE:
A high-quality science education provides the foundations for understanding the world through the specific disciplines of biology, chemistry and physics. Science has changed our lives and is vital to the world's future prosperity, and all pupils should be taught essential aspects of the knowledge, methods, processes and uses of science. Through building up a body of key foundational knowledge and concepts, pupils should be encouraged to recognise the power of rational explanation and develop a sense of excitement and curiosity about natural phenomena. They should be encouraged to understand how science can be used to explain what is occurring, predict how things will behave, and analyse causes. This curriculum of learning has been designed to build upon the experiences encountered at Key Stage 2 at and the curriculum taught at Primary school.

SUMMARY OF YEAR 7 (3 hours/week – Taught in form groups)
Learning science through investigations and problem solving is important to develop a deeper scientific understanding. We begin the journey in year 7 introducing the basic principles of scientific enquiry and how scientists analyse information. This provided key skills including devising methods, drawing graphs and writing a conclusion. Following this pupils learn 2 different topics for each science (either Biology, Chemistry, Physics) each term, covering the fundamental scientific concepts to support the rest of their scientific journey.

Throughout each topic scientific enquiry will play a large role in learning and developing understanding with the skills learnt in term one used regularly in all other topics.

Assessments will aim to assess the knowledge and skills a student has covered up to that point in their education.

1) Spring term (week 4-5)
2) Summer term (end of year assessment)

TERM	1: AUTUMN	2: SPRING	3: SUMMER
Topics covered	**Introduction unit – SCIENTIFIC ENQUIRY** ♦ Working safely in a lab ♦ Identifying apparatus and describing its uses ♦ Identifying variables ♦ Writing and following methods ♦ Making good observing ♦ Recording data in a table and drawing bar/line graphs	**LIGHT & SOUND** ♦ Types of wave and wave speed ♦ Luminous and non-luminous objects ♦ How light behaves including reflection and refraction ♦ The eye structures and function ♦ The electromagnetic spectrum, colours and filters	**PARTICLES & SEPARATING** ♦ Differences between atoms, elements and compounds ♦ The concept of a pure and impure substance ♦ The Periodic Table: periods and groups; metals and non-metals, patterns in reactivity. ♦ Differences between physical and chemical changes

Topics covered	♦ Calculating a mean, range, median, and mode. ♦ Describing trends in data and using supportive evidence ♦ Evaluating methods and results to produce more accurate findings **CELLS & ORGANISMS** ♦ Structures of plant and animal cells, similarities and differences ♦ Functions of the parts of cells ♦ Using a light microscope ♦ Specialised cells in plants and animals; adaptations and function ♦ Organisation in multicellular organisms (Cells, tissues, organs, systems) ♦Unicellular organisms ♦ Pathogens and disease including methods of transmission ♦ Bodily defences against disease. **PARTICLES & ENERGY** ♦Physical properties of metals and non-metals. ♦ Properties of the different states of matter in terms of the particle model ♦ Kinetic theory and particle diagrams ♦ Changing state including melting points and boiling points ♦ Diffusion of particles in liquids and gases ♦Gas pressure and particles ♦ Heating and thermal energy transfers -conduction, convection and radiation	♦ Detecting and analysing sound waves: changes in frequency and amplitude ♦ The ear and hearing sounds **REPRODUCTION & GENETICS** ♦ Reproduction in humans; structure and function of the male and female reproductive systems ♦ Specialised cells; sperm and egg ♦ Puberty, the menstrual cycle and hormones ♦ Fertilisation, gestation and birth, to include the effect of maternal lifestyle on the foetus ♦ Genetic and environmental variation ♦ Types of data; continuous and discontinuous ♦ Natural selection, selective breeding and genetic modification **SCIENTIFIC ENQUIRY** ♦ All skills from term 1 are interwoven throughout these units where appropriate)	♦ Chemical symbols and formulae for elements and simple compounds ♦ Mixtures, dissolving and solubility ♦ Separating mixtures using simple techniques: - Filtration - Evaporation - Chromatography - Fractional distillation **SPACE EXPLORATION** ♦ Explaining day and night ♦ Explaining the seasons ♦ Phases of the moon and different eclipses ♦ Our solar system and beyond ♦ Space exporation – major events and discoveries ♦ How we explore space ♦ Gravity and mass **SCIENTIFIC ENQUIRY** ♦ All skills from term 1 are interwoven throughout these units where appropriate)

SCIENCE **YEAR 8** **KS3**

SUMMARY OF CURRICULUM: (3 hours/week – Taught in set groups)

Students complete 2 different topic of science each term (either Biology, Chemistry, Physics). Each unit covers various scientific principles to build new knowledge, while continuing to practice scientific enquiry skills through practical investigation. Throughout each topic scientific enquiry will play a large role in learning and developing understanding with the skills learnt in year 7 used regularly in all other topics.

Ideas from year 7 will be revisited to support students to constantly gain new knowledge and consolidate prior learning. Students are routinely exposed to challenging and difficult concepts and ideas where they are required to apply the knowledge they have acquired to different or new contexts.

Assessments will aim to assess the knowledge and skills a student has covered up to that point in their education, this also includes the curriculum covered in the previous year/s.

1) Spring term (week 4-5)
2) Summer term (end of year assessment)

TERM	1: AUTUMN	2: SPRING	3: SUMMER
Topics covered	**FORCES & MOTION** ♦ Forces as pushes or pulls ♦ Hooke's law and making a force meter ♦ Using force diagrams for balanced and unbalanced forces ♦ Newton's laws of motion to describe the effect of forces on different objects ♦ Factors affecting friction ♦ Distance-time graphs ♦ Air resistance and terminal velocity ♦ Investigating turning forces (moments) and using levers ♦ Magnetic force and temporary magnets ♦ Forces and pressure ♦ Taking measurements,	**THE HUMAN BODY** ♦ Cellular structures and specialised cells ♦ Aerobic and anaerobic respiration ♦ Structure and functions of lungs and respiratory system ♦ The impact of exercise, asthma and smoking on the human gas exchange system ♦ Tissues and organs of the digestive system and their adaptations ♦ Healthy human diet and deficiencies ♦ Calculations of energy requirements in a healthy daily diet ♦ Structure and functions of the human skeleton	**CHEMICAL REACTIONS** ♦ Differences between atoms, elements and compounds ♦ Properties of metals and non-metals ♦ Oxidation and corrosion of substances ♦ Combustion reactions (complete and incomplete) ♦ Conservation of mass in chemical reactions ♦ Reaction of metals with acids (recap), and water ♦ The reactivity series ♦ Displacement reactions ♦ Reaction of metal carbonates (rocks) with acids

Topics covered	calculating means ♦ Using simple equations including calculating speed, acceleration, pressure, density, moments **ACIDS & NEUTALISATION REACTIONS** ♦ Hazard symbols and risk assessments ♦ Differences between physical and chemical changes ♦ Differences between atoms, elements and compounds ♦ Acids, alkalis and their uses ♦ Neutralisation reactions of acids and alkalis. ♦ Using the pH scale and indicators ♦ Reactions of acids with metals and metal carbonates ♦ Gas collection and testing gases ♦ Making a pure dry sample of a salt ♦ Writing word and symbol equations to model reactions **SCIENTIFIC ENQUIRY** ♦ All skills from year 7 are recapped are interwoven throughout these units where appropriate)	**ENERGY & ELECTRICITY** ♦ Energy stores and transfers ♦ Types of energy resources (advantages and disadvantages) ♦ Energy from food ♦ Circuit diagrams and symbols ♦ Materials are conductors and insulators ♦ Measuring potential difference, current and resistance ♦ Models of series and parallel electrical circuits ♦ Making fruit batteries (chemical cells and metal reactivity) ♦ Using simple equations including calculating Voltage, current, resistance, power, **SCIENTIFIC ENQUIRY** ♦ All skills from year 7 are recapped are interwoven throughout these units where appropriate)	♦ Writing word and symbol equations to model reactions ♦ Gas collection and testing gases ♦ Thermal decomposition of metal carbonates and their reactivity. **SCIENTIFIC ENQUIRY** ♦ All skills from year 7 are recapped are interwoven throughout these units where appropriate) **PLANTS & ECOLOGY** ♦ Recall the structure and function of plant cell: Palisade, root hair, xylem, phloem. ♦ How plants take in water and carbon dioxide and the process of photosynthesis ♦ The adaptations of leaves and roots Factors affecting photosynthesis ♦ Habitats and environmental factors ♦ Adaptations of plants and animals to the environment ♦ Feeding relationships ♦ Representation data in pyramids of numbers and energy ♦ Energy transfers in organisms ♦ Classification of living things including the features of groups in vertebrates ♦ Sampling techniques

SCIENCE **YEAR 9** **KS3/KS4 transition**

KS4 (Year 9-11) CURRICULUM NARATIVE:
We follow the Pearson Edexcel specification. Our Key Stage 4 curriculum fully prepares for A-level study in science. Our GCSE syllabus is taught to students in one of two pathways: Triple or Combined. The Triple leads to the award of three distinct GCSEs in the respective disciplines (Biology, Chemistry, Physics) and must be chosen as one of the 4 option choices (options are at end of yr9). The Combined leads to the award of two distinct GCSEs representing overall grades of the three disciplines. Both pathways provide students with the necessary skills and subject knowledge which they need to facilitate their studying of either A-Levels or the BTEC professional pathway. In both cases, the students build on the key skills and knowledge they have acquired through their studies of KS3 science. At GCSE, students will work on a series of Core Practical investigations which are designed to teach students about essential theoretical concepts in science whilst giving students a chance to hone their practical and fine motor skills. Subject specialists at this level teach all students with separate teachers. There are large components of mathematical skills that go hand in hand with the content taught in maths curriculum. Students learn how to become confident experimental scientists through Core practicals and develop skills that they can take to A-level or BTEC. Students enjoy a curriculum that is designed to enable them to understand the world around them with scientific rigour. Within each class, the subjects are taught on rotation, to ensure availability of resources, due to the fact that Science is banded and setted, with 5 groups in each band.

SUMMARY OF CURRICULUM: **(4 hours/week – Taught in set groups)**
At the start of year 9 students complete 1 topic of science each term (either Biology, Chemistry, Physics) to complete the KS3 material. At the end of term 1 students will start to look at KS4 material initially by covering the 'Key concepts' topics to revisit and broaden their understanding of the central ideas.
Pupils will rotate around the units and continue to learn through problem solving and scientific enquiry.

Assessments will assess the knowledge and skills a student has covered in the current topic. These will be in the form of end of unit tests using GCSE style questions to gain experience and practice in preparation for GCSE examinations. Some topics will not be formally assessed but will be conducted as open book exam style activities.
An end of year assessment looking at material covered throughout the year will take place in June/July.

TERM	1: AUTUMN	2: SPRING	3: SUMMER
Topics covered	**SCIENTIFIC ENQUIRY** ♦ Recap of essential skills including – Apparatus, variables, presenting results, processing and analysing data, graphs and conclusion.	**B1 – KEY CONCEPTS** This unit introduces some of the central ideas in biology, including ideas about cells, microscopy, enzymes, nutrition, diffusion, osmosis and active transport.	**B2 – CELLS AND CONTROL** This unit introduces how plants and animals develop from single cells the size of full stops to become complex organisms made of many different types of cells, which all need to be controlled and coordinated.

FORENSIC SCIENCE

- forensic anthropology
- DNA, DNA profiling and fingerprinting
- Blood and blood type inheritance
- Using evidence to problem solve

APPLIED PHYSICS

- energy stores and transfers
- Energy efficiency including Sankey diagrams and calculations
- Generating electricity
- Recall that heat energy can travel by conduction, convection and radiation

Pressure and hydraulics

EARTH & ATOMPOSPHERE

- Structure of the earth
- The rock cycle and weathering
- Earth as a resource; metals and rocks
- The atmosphere
- Greenhouse gases, global warming and acid rain

- how developments in microscopy have allowed us to find out more about the sub-cellular structures found in plant, animal and bacterial cells
- about the importance of enzymes in nutrition, growth and development
- how enzymes are affected by pH and temperature and why each enzyme only works on a certain type of molecule
- how to carry out food tests and calorimetry
- how substances are carried by diffusion, osmosis and active transport.

C1/2 – STATES AND SEPARATING

This unit introduces how materials can be separated from one another using their properties.

- how to use information to predict the state of a substance
- how the arrangement, movement and energy of particles change during changes of state
- how to use melting points to tell the difference between mixtures and pure substances
- how to identify substances using melting points and chromatography
- how different methods of separation work
- how to choose a separation method based on the properties of the substances in a mixture.

P4/5 – WAVES AND EM SPECTRUM

This unit introduces you to waves characteristics and how they transfer energy and information.

- that waves transfer energy and information
- how to describe the characteristics of waves
- how the speed of a wave is related to its frequency and wavelength, and to the time it takes to travel a certain distance
- how waves are refracted at boundaries between different materials
- what happens when waves are reflected, refracted, transmitted or absorbed by different materials
- more about how our ears work
- about the uses of ultrasound and infrasound.

- about mitosis and its importance in growth, repair and asexual reproduction
- how cells become specialised, and the importance of stem cells
- to identify different specialised cells in the nervous system and explain how the system works
- how the eye works, and how some eye problems are corrected.

C3/4 – ATOMIC STRUCTURE & PERIODIC TABLE

This unit introduces the history of the atomic model how elements have been ordered using the periodic table

- how our ideas about atoms have changed
- what a relative atomic mass is
- H how to calculate relative atomic mass for an element
- how Mendeleev arranged the elements known at the time in a periodic table
- how Mendeleev predicted the existence and properties of undiscovered elements
- how Henry Moseley helped to confirm Mendeleev's ideas
- how the elements are arranged in the modern periodic table
- how to use the periodic table to predict and model the arrangement of electrons in atoms.

P1/2 – MOTION AND FORCES

This unit introduces you to quantities that have directions (such as forces). You will find out how to calculate speeds and accelerations, and how to represent changes in distance moved and speeds on graphs.

- the difference between vector and scalar quantities
- how to calculate speed and acceleration
- how to represent journeys on distance/time and velocity/time graphs
- how to use graphs to calculate speed, acceleration and distance travelled.
- about Newton's Laws of Motion
- how to calculate the weight of an object from its mass
- about the factors that affect the stopping distance of a vehicle
- how to use ideas about energy transfers to calculate braking distances
- about the dangers of large decelerations
- H how to calculate momentum, and apply ideas about momentum to collisions.

SCIENCE **YEAR 10** **KS4/GCSE**

SUMMARY OF CURRICULUM: (4 hours/week combined science – Taught in set groups) (7 hours/week separate sciences)
Students will have chosen their options and will either follow the combined science GCSE route (worth 2 GCSE) or the separate science route (3 GCSE) Combined scientists continue to rotate through different topics of science each term (either Biology, Chemistry, Physics). Triple scientists will have 2 hours with a specialist teacher and 1 other

Assessments will assess the knowledge and skills a student has covered in the current topic. These will be in the form of end of unit tests using GCSE style questions to gain experience and practice in preparation for GCSE examinations. Some topics will not be formally assessed but will be conducted as open book exam style activities.
An end of year mock exam looking at material covered in paper 1 will take place in June/July.

TERM	1: AUTUMN	2: SPRING	3: SUMMER
Topics covered	**B3 – GENETICS** This unit introduces you to DNA code that produces our features and the processes that allow features to be passed on from parents to their offspring. Student learn: • about sexual and asexual reproduction, and the need for meiosis • about the structure of DNA and its role in protein synthesis • about mutations and the causes of genetic variation • how the inheritance of some characteristics occurs in families. **B4 – NATURAL SELECTION** This unit explains the development of the theory of evolution by natural selection. Student learn:	**B5 – HEALTH AND MEDICINE** This unit will help you understand what we define health, disease, and how new medicines are develop. Student learn: • about how we define health • about some pathogens, the diseases they cause, and how their spread can be reduced or prevented • about the lifecycle of viruses • how plants defend themselves from pests and pathogens • how the body is protected against infection • about the immune system • how antibiotics work • about aseptic techniques for culturing microorganisms • how new medicines are developed • H how plant diseases can be identified. **C8 - ACIDS** This unit helps you explore the nature of acidic and alkaline solutions, and their most important reactions, properties and uses. Student learn:	**B6 – PLANTS AND STRUCTURES** This unit introduces you to photosynthesis, absorbing water and mineral ions, transpiration and translocation, plant adaptations, and plant hormones and their uses. Student learn: • more about photosynthesis and how different factors affect its rate • how the rate of water uptake by a plant is affected by different factors • how the reactants for and products of photosynthesis are transported • more about leaf structure and specialised cells (including palisade, spongy, epidermis, root hair, xylem and phloem cells) • about the effects and uses of plant hormones. **C9 – CALCULATIONS** This unit will help you to use relative atomic masses to calculate relative formula masses of elements and compounds, calculate the concentration of a solution and work out empirical and molecular formulae of compounds. Student learn: • how to use relative atomic masses to calculate relative formula masses of elements and compounds • how to work out empirical and molecular formulae of compounds • how to calculate the mass of reactants or products in a reaction • how to calculate the concentration of a solution • H about the Avogadro constant and the quantity 1 mol of a substance • H how to calculate the numbers of particles in a substance.

- about the development of the theory of evolution by natural selection
- how different methods, including genetic analysis, are being used to investigate evolution
- how organisms are classified
- how selective breeding and genetic engineering are carried out, and their benefits and drawbacks
- why tissue culture, GMOs, fertilisers and biological control are used in agriculture.

C5-7 BONDING

These units help us understand how bonds being formed and broken is essential in helping us explain even the simplest physical change or chemical reaction.
Student learn:

- how ionic, covalent and metallic bonds are formed
- about the formation of lattice and molecular structures
- how the physical properties of a substance are linked to its bonding and structure.

P3 – CONSERVATION OF ENERGY

This unit introduces you to ways in which energy can be transferred and stored, how to reduce energy transfers, and the renewable and non-renewable resources we use in everyday life. Student learn:

- how energy is stored and transferred
- how to represent energy transfers using diagrams
- how to calculate efficiency
- how to reduce transfers of wasted energy
- how to calculate the amount of gravitational potential energy or kinetic energy stored in objects
- about the different renewable and non-renewable resources we use to make electricity, for heating and cooking, and for transport.

- about the ions in acids and alkalis, and how their concentrations are linked to pH
- what happens in the reactions between acids and different types of bases
- how different indicators can be used in acid–alkali titrations
- how different soluble and insoluble salts can be prepared in the laboratory.

P6 - RADIATION

In this unit you will learn about different types of radiation and how radioactivity can be used. Student learn:

- how the particles inside atoms are arranged
- how to represent atoms using symbols
- about the different types of radiation and how they affect atoms
- about the background radiation that is all around us
- about uses of radioactivity in the home and industry
- about the dangers of radiation and how we can protect ourselves
- how radioactive materials are used to diagnose and treat cancer
- about the advantages and disadvantages of nuclear power
- what fusion and fission nuclear reactions are.

P7 - ASTRONOMY *(TRIPLE ONLY)*

In this unit you will learn about the Solar System, origin of the Universe, and the life cycles of stars. Student learn:

- about the bodies in our Solar System and how ideas about the Solar System have changed over time
- how methods of observing the Universe have changed over time
- why gravity is different on different bodies and how this affects orbits
- what redshift is and what it shows
- about different theories on the origin of the Universe
- about the life cycles of stars.

C10 - ELECTROLYSIS

This unit will help you to learn more about reactivity, oxidation and reduction, the advantages of recycling, about the Haber process and what happens during electrolysis. Student learn:

- more about reactivity, oxidation and reduction
- about how metals can be extracted
- about the advantages of recycling metals
- about the life cycle assessment of products
- to explain what happens during electrolysis and electroplating
- about equilibria in chemical reactions
- about the Haber process
- H how to write half equations
- about the properties of transition metals
- properties and uses of metals and their alloys.

P8/9 - FORCES DOING WORK

In this unit you will learn more about how forces can transfer energy. You will also learn about force fields, and how to use vector diagrams to work out what happens when several different forces act on an object at the same time. Student learn:

- how the energy in a system can be changed
- how to calculate power and work done
- how objects interact with each other, through force fields and contact forces
- about rotational forces, calculating moments and how levers and gears work
- H how to use vector diagrams to work out the effects of forces on an object.

SCIENCE **YEAR 11** **KS4/GCSE**

SUMMARY OF CURRICULUM: (4 hours/week combined science – Taught in set groups) (7 hours/week separate sciences)
Student will continue to follow the combined science GCSE route (worth 2 GCSE) or the separate science route (3 GCSE) to complete the course. Combined scientists continue to rotate through different topics of science each term (either Biology, Chemistry, Physics). Triple scientists will have 2 hours with a specialist teacher and 1 other.
Assessments will assess the knowledge and skills a student has covered in the current topic. These will be in the form of end of unit tests using GCSE style questions to gain experience and practice in preparation for GCSE examinations. Some topics will not be formally assessed but will be conducted as open book exam style activities.

ASSESSMENT: Paper 1 mock exam November
Paper 2 mock exam March/April

TERM	1: AUTUMN	2: SPRING	3: SUMMER
Topics covered	**B7 – ANIMAL COORDINATION, CONTROL AND HOMEOSTASIS** This unit introduces you to hormones, hormonal control and metabolic rate, the menstrual cycle, control of blood glucose, type two diabetes, thermoregulation, osmoregulation, and the kidneys. Student learn: • about endocrine glands • how hormones are transported to their target organs • how the menstrual cycle is controlled by hormones and how hormones are used in contraception • about the importance of homeostasis • about how thermoregulation occurs • about diabetes and how blood glucose concentration is controlled • how the kidneys produce urine, and about treatments for kidney failure • H how the hormones thyroxine and adrenalin affect the body • H what a negative feedback mechanism is.	**B9 – ECOSYSTEMS** This section introduces you to ecosystems, energy transfer, abiotic factors and communities, biotic factors and communities, assessing pollution, parasitism and mutualism, biodiversity and humans, preserving biodiversity, food security, the water cycle, the carbon cycle, the nitrogen cycle and rates of decomposition. Student learn: • how ecosystems are organised • how communities are affected by abiotic and biotic factors • how the abundance and distribution of organisms are measured • how energy is transferred through trophic levels • about parasitism and mutualism • how humans can affect ecosystems and the benefits of maintaining biodiversity • about the importance of the carbon cycle, water cycle and nitrogen cycle • how indicator species can be used to assess pollution levels • why the rate of decomposition of food and compost can vary.	Revision and preparation for examinations. **GCSE examinations** : May - Paper 1 (BIOL/CHEM/PHYS) June – Paper 2 (BIOL/CHEM/PHYS) **Combined science** - 6 papers each 60 marks (70 minutes each) **Triple science** – 6 papers each 100 marks (105 minutes each)

B8 –EXCHANGE AND TRANSPORT IN ANIMALS

This unit introduces you to transport and exchange, factors affecting diffusion, the circulatory system, the heart and cellular respiration. Student learn:

- about diffusion
- about different animal cells and their adaptations.

In this unit you will learn:

- more about diffusion, gas exchange and the surface area : volume ratio
- about the rate of diffusion and Fick's law
- more about the different types of respiration
- how the lungs, heart, blood vessels and blood are adapted for their functions
- how to calculate cardiac output.

C14-17 QUANTITATIVE ANALYSIS, EQUILIBRIA AND CELLS *(TRIPLE ONLY)*

This unit will help you to learn more about reaction pathways. SC15 covers fertiliser and the Haber process, and factors affecting equilibrium. SC16 looks at chemical cells and fuel cells. Student learn:

- reasons why the actual yield of a reaction is less than the theoretical yield
- to calculate the percentage yield of a reaction
- what is meant by the atom economy of a reaction and how to calculate it
- how to carry out an acid–alkali titration
- H how to calculate an unknown concentration or volume of a solution using titration
- H about the factors that are considered when selecting a manufacturing method
- H how to interconvert between g dm^{-3} and mol dm^{-3}.

C20-21- FUELS, EARTH AND ATMOSPHERE

SC20 covers hydrocarbons, fractional distillation of crude oil, the alkane homologous series, complete and incomplete combustion, fuel and pollution. SC21 looks at the earth's atmosphere. Student learn:

- about the hydrocarbons found in crude oil and natural gas
- how crude oil is separated into useful fractions
- about the alkanes as an homologous series
- about the problems caused by some atmospheric pollutants
- how and why cracking of oil fractions is carried out
- about the advantages and disadvantages of different fuels for cars
- about how the Earth's atmosphere has changed in the past and how it is changing now
- more about the causes and effects of climate change.

C22-26 HYDROCARBONS, POLYMERS, QUALITATIVE ANLAYSIS (TRIPLE ONLY)

This unit covers alkanes and alkenes and will look at ethanol production and carboxylic acids. Testing for ions. Different materials and properties. Student learn:

- about the structures and properties of alkanes and alkenes
- how a concentrated solution of ethanol is produced from carbohydrates
- about the structures of alcohols and carboxylic acids
- about the chemical properties and uses of alcohols and carboxylic acids
- about the composition of biological polymers
- how poly(ethene) and other polymers are made
- about the disposal and recycling of polymers.
- how to identify metal ions
- the chemical tests for various non-metal ions and for ammonia gas
- about instrumental methods of analysis and their advantages
- how to compare the physical properties of different materials
- what composite materials are
- how and why materials are chosen for particular uses
- about nanoparticles and their properties, uses and possible risks.

C17-19 -GROUPS AND RATES OF REACTION

This unit covers groups in the periodic table and halogen reactivity, rates of reaction and catalysts, and explores exothermic and endothermic reactions and energy changes in reactions. Student learn:

- about the properties and reactions of the elements in groups 1, 7 and 0.
- how changes in conditions can affect the rates of reactions
- about the energy transfers that can occur during chemical reactions.

P10/11 - ELECTRICITY

In this unit you will learn about how electricity is supplied and used in different circuits. Student learn:

- about current, charge and potential difference
- how to calculate resistance, power and energy transferred
- about components with changing resistance
- about the UK domestic electricity supply and electrical safety features in homes
- how earthing works and why it is important.
- about the shape and size of electric fields and how they explain some phenomena caused by static electricity.

P12/13- MAGNETISM & ELECTROMAGNETISM

In this section you will learn about electromagnetic induction. Student learn:

- about permanent and induced magnets, and how to represent a magnetic field
- about the magnetic field around a current in a wire and the factors that affect it
- how the fields from the individual coils in a solenoid interact
- how to use the power equation for transformers
- how transformers are used in the national grid
- H how to use the turns ratio equation for transformers
- H how a current can be induced in a wire and the factors that affect it
- H how to work out the size and direction of the force on a wire carrying a current in a magnetic field.

P14/15 PARTICLES AND ENERGY

In this unit you will learn how the particle model explains properties of matter, and about forces and matter. Student learn:

- how to explain different densities of substances and how to calculate density
- about specific heat capacity and specific latent heat
- how changing the temperature and volume of a gas affects its pressure and how to calculate temperatures and pressures
- about elastic and inelastic distortion
- about the relationship between force and extension, and how to calculate the extension and spring constant
- how to calculate the work done when stretching a spring
- how pressure in fluids depends on density and depth.