CURRICULUM – SCIENCE

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Southchurch High School

Biology | **Chemistry** | **Physics**

Year Group	Half-term 1	Half-term 2	Half-term 3	Half-term 4	Half-term 5	Half-term 6
Year 7	**Cells** *Students learn about the basic structure of plant and animal cells and some specialized cells. They also learn about unicellular structures and how cells move substances through diffusion, osmosis and active transport. They will get the opportunity to use microscopes and prepare their own microscope slide.* **Particle model** *Students review their prior knowledge of what matter is made up of and deepen this learning with changes of state and the differences between boiling and heating. Students develop a clear understanding for each state of matter.*	**Matter** *Students focus on what an element, atom and compound is. They develop their knowledge of different chemical formulae and become much more familiar with the periodic table of elements and the symbols.* **Space** *Students will delve into the universe and the night sky. They will learn more about the solar system and how the Earth and moon interact forming seasons and night and day.* **Breathing and respiration** *Students begin with learning about gas exchange and what can negatively impact this. They further this knowledge and learn about key concepts of respiration, both aerobic and anaerobic.*	**Breathing and respiration** *Students finish this topic with practicals on response to exercise and learning about fermentation, including what this looks like with yeast.* **Reactions** *Students further their chemistry learning and focus on acids and alkali reactions. They learn about indicators, the pH scale and neutralization through theory and practical lessons. They even make salts during this topic!* **Reproduction** *Students begin this topic by learning about flowers and how they reproduce, they then go on to learn about how fertilization and germination happen.*	**Reproduction** *Students follow this topic learning about adolescence and the reproductive systems. They focus on the development of a foetus and the menstrual cycle.* **Energy** *Students look at food and fuel and energy resources that are available to human populations. They delve into what energy and power is and how energy can dissipate into the surroundings.*	**Periodic table** *Students further their knowledge of the periodic table of elements by understanding what groups and periods are, focusing on properties of group 1, 7 and 0.* **Adaptations** *Students study what variation is and how different organisms adapt to their environment. They even get to complete a sampling practical to focus on population sizes.* **Forces** *Students put their math skills into play by learning about different types of forces. They look at speed and distance-time graphs.*	**Forces** *Students follow this topic on and focus on friction and drag and how these interact. They use their maths skills to calculate turning forces.* **Movement** *Students review the skeleton and the musculoskeletal system where they hone in on joints and muscles, specifically antagonistic muscles.* **Earth** *Students look at the structure of the earth and the rocks that make it up: igneous, sedimentary and metamorphic. They see how they are formed from the rock cycle.*

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Year 8	**Breathing** *Students begin with learning about gas exchange and what can negatively impact this. They focus on the process of breathing and the consequences of smoking, drugs and alcohol.* **Digestive system** *Students look at food groups and how to test for these in a practical. They also focus on unhealthy diets and what enzymes are, how they contribute to the breakdown of substances in the digestive system.*	**Forces** *Students study friction and drag forces and squashing and stretching forces. They use turning forces and apply maths skills. They also study pressure in gases and liquids and stress on solids.* **Matter** *Students study element, atoms and compounds. They focus on how chemical formulae are written. They also look at the Periodic Table and the main groups (1, 7 and 0).* **Earth** *Students focus on global warming, the carbon cycle and climate change. They focus on what processes are involved in the carbon cycle and which gases contribute to global warming and climate change. They review what human populations do that also contributes to this.*	**Earth** *Students study extracting metals and recycling. They focus on how metals are extracted using their reactivity and if it an ore or not.* **Waves** *Learners review the types of waves and their properties before they look at sound waves, water waves and energy. They study radiation and how waves are modelled.* **Energy** *Students study work, energy and machines. They learn the difference between heat and temperature and how energy is transferred through particles.* **Reactions** *Students deepen their knowledge of chemicals by looking at how atoms react in chemical reactions. They learn about combustion and thermal decomposition. They also take a look at exothermic and endothermic reactions.*	**Reactions** *Students review exothermic and endothermic reactions using energy level diagrams and how to calculate bond energies.* **Ecosystems** *Students study aerobic and anaerobic respiration. They then recap briefly plant cells and active transport before they study photosynthesis and what affects this. They complete a core practical of how the rate of photosynthesis is affected by a variable.*	. **Circuits** *Students study basic principles of circuits including potential difference, resistance and series and parallel circuits. They will also learn what current is.* **Genes** *Students focus on natural selection and Darwins theory. They study extinction and biodiversity. They also look at DNA and genetics, along with inheritance.* **Pathogens and diseases** *Students start to understand different diseases and how they are transferred. They take a look at how the human body responds to these.*	**Electromagnets** *Learners focus on magnets and magnetic fields, the they study electromagnets, what they are and how to use them* **Ecology** *Students briefly recap what variation is and adaptations before delving into food chains and webs and how these can be disrupted by disease or human interaction. They learn the definition of ecosystem.*

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Year 9	**Cells** *Students will recap and further their knowledge of cells and specialized cells. They learn about diffusion and osmosis in more depth and application of movement of substances and exchanging materials.* **Atoms** *Students learn about atoms in chemical equations and different separating methods.*	**Atoms** *Students further their knowledge of atoms by learning the history of the atom, the electronic structure and what an ion and isotope is.* **Energy stores** *Students delve into different energy stores such as gravitational potential, kinetic and elastic potential energy. They also look at conservation of energy and efficiency.* **Periodic Table** *Students study the periodic table and the specific properties of groups 1 and 7. They will be able to identify elements from groups 1,7 and 0 by their electronic structures.*	**Cell division** *Students look at how cells divide through mitosis and specifically at differentiation. They focus also on stem cells, what they are and where they are in animals and plants.* **Digestive system** *Students first learn about the tissues and organs in the digestive system, then at food groups and how to test for starch, sugar, fats or protein. They then focus on enzymes and the part they play in digestion.*	**Energy transfer by heating** *Students focus on how energy is transferred, either through conduction, convection or radiation. Each has their own properties and learners will use specific heat capacity to explain how thermal energy is transferred in different materials.* **Structure and bonding** *Students have now understood what makes up an atom so they will develop understanding of how elements form ionic, covalent and metallic bonds, with a concrete focus on a variety of examples of each type of bond.*	**Organisation of animals and plants** *In this topic, students look at the heart and all what is involved, they then pursue knowledge of gas exchange in the respiratory system and finally focus on plant tissues and organs that are involved in transporting water and other substances around the plant including what transpiration is.* **Electrical circuits** *Students will retrieve their knowledge of electric circuits and delve deeper into potential difference, current and charge, resistance and the types of circuit: series or parallel. They will look at how resistance can change in a circuit depending on components.*	**Mains electricity** *Students look at what makes up a plug and what AC and DC is. They focus on electrical power and current, potential difference and efficiency.* **Energy resources** *Students look further into sources of energy whether that be fossil fuels or renewable energy sources and how this arrives at homes and factories.* **Photosynthesis** *Students finish the year looking at the process of photosynthesis and what affects this: light intensity, concentration of carbon dioxide or temperature.*

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Year 10	**Periodic Table** *Students will develop their understanding of the periodic table by studying the properties of Groups 1 and 7. They will apply their knowledge of electronic structures to identify elements in Groups 1, 7, and 0.* **Organisation of animals and plants** *Students will study the structure and function of the heart and circulatory system, investigate gas exchange in the respiratory system, and examine the tissues and organs responsible for transporting water and other substances in plants, including the role of transpiration.* **Energy transfer by heating** *Students will explore how thermal energy is transferred through conduction, convection, and radiation. They will investigate the characteristics of each method of energy transfer and use the concept of specific heat capacity to explain how thermal energy is transferred in different materials.* **Energy resources** *Students will compare renewable and non-renewable energy resources, including fossil fuels, and develop an understanding of how electrical energy is generated and transferred through the National Grid to homes and factories.* **Particle model** *Students study density and changes of state, they focus on internal energy and specific latent heat.*	**Communicable diseases** *Students look at health and what can cause disease. They study examples of viral, bacterial and fungal diseases including salmonella, HIV, malaria, rose black spot and others.* **Preventing disease** *Students focus their learning on how the human body fights infection and what vaccination and antibiotics are. They learn about how new drugs are discovered.* **Non-communicable diseases** *Students study what non-communicable disease is and focus on cancer and risks that can cause non-communicable diseases.* **Structure and bonding** *Students will apply their knowledge of atomic structure to understand how ionic, covalent, and metallic bonds are formed. They will examine a variety of substances to identify and compare the different types of bonding.* **Chemical changes** *Students revise the reactivity series and study displacement reactions and how to extract metals depending on their reactivity and which process is best.*	**Chemical changes** *Students delve further into salts and how these are produced whether that be from metals or insoluble bases. They review the pH scale and learn more about neutralization and strong and weak acids.* **Photosynthesis** *Students look at the process of photosynthesis and what affects this: light intensity, concentration of carbon dioxide or temperature.* **Chemical calculations** *Students use their chemistry knowledge and maths skills to calculate relative formula masses, concentrations and moles of substances along with balancing equations.* **Electrical circuits** *Students will retrieve their knowledge of electric circuits and delve deeper into potential difference, current and charge, resistance and the types of circuit: series or parallel. They will look at how resistance can change in a circuit depending on components.* **Mains electricity** *Students look at what makes up a plug and what AC and DC is. They learn why fuses are important in plugs and which wire is which.*	**Mains electricity** *Students focus on electrical power and current, potential difference and efficiency. They learn more about appliances and their electrical efficiency.* **Respiration** *Students focus on aerobic respiration, anaerobic respiration where they learn about build up of lactic acid and oxygen debt then they look at metabolism and the function of the liver.* **Homeostasis** *Students learn about the structure of the nervous system and reflex actions. They study the definition of homeostasis and how factors can affect the human reaction time.* **Motion** *Students retrieve their knowledge of speed and use graph skills in this topic where they analyze speed and distance-time graphs, also learning more about velocity and acceleration.* **Force and motion** *In this topic, students focus on weight as a force and braking. They learn what braking distance is and what it is composed of.*	**Force and motion** *Students focus on forces and elasticity, specifically on Hooke's law and what limit of proportionality is with stretch tests* **Hormonal control in humans and plants** *Students start by looking at blood glucose levels and understanding what a negative feedback system is. They study the types of diabetes and then proceed onto human reproduction including the hormones involved in the menstrual cycle and the concept of fertility and contraception.* **Energy changes** *Students look at how within a reaction the amount of energy may change and so focus on exothermic and endothermic reactions, looking at examples and how to investigate temperature changes and what reaction profiles are. Finally, they will be able to calculate bond energies from modelled examples.* **Electrolysis** *Students learn what electrolysis is and the different parts that make up the process. They look at electrolysis of molten substances and aqueous solutions. They also focus on the extraction of aluminium.* **Radioactivity** *Students learn about alpha, beta and gamma radiation and what makes them different. They will be able to compare different graphs of half-lives of radioactive substances and calculate the activity after a set time.* **Forces in balance** *Students learn what a vector and a scalar is. They also look at contact forces.*	**Forces in balance** *Students continue this topic focusing on resultant forces, centre of mass and parallelogram of forces, finishing with resolution of forces.* **Revision** *In the run up to mocks, students will focus on their weaker topics identified by their teachers from previous key tasks and assessments.*

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Year 11	**Radioactivity** *Students learn about alpha, beta and gamma radiation and what makes them different. They will be able to compare different graphs of half-lives of radioactive substances and calculate the activity after a set time.* **Homeostasis** *Students learn about the structure of the nervous system and reflex actions. They study the definition of homeostasis and how factors can affect the human reaction time.* **Hormonal control in humans and plants** *Students start by looking at blood glucose levels and understanding what a negative feedback system is. They study the types of diabetes and then proceed onto human reproduction including the hormones involved in the menstrual cycle and the concept of fertility and contraception.* **Variation and evolution** *Students study genetic and environmental variation, focusing on mutations and survival of the fittest. They then proceed to natural selection, selective breeding and genetic engineering.* **Forces in balance** *Students continue this topic focusing on resultant forces, centre of mass and parallelogram of forces, finishing with resolution of forces.* **Motion** *Students retrieve their knowledge of speed and use graph skills in this topic where they analyze speed and distance-time graphs, also learning more about velocity and acceleration*	**The Earth's resources** *Students build on their knowledge of the Earth's atmosphere and pollutants, they will apply this knowledge to treating water and extracting metals including recycling.* **Rates and equilibrium** *Students will learn to apply knowledge of speed of reaction to a practical application. They will study the different effects on the rate of reaction.* **Mocks** **Rates and equilibrium** *Students finish off the topic of rates by focusing on reversible reactions and dynamic equilibrium* **Organic chemistry** *Students study hydrocarbons and fractional distillation of crude oil. They look into combustion and cracking hydrocarbons.* **Genetics and evolution** *Students will learn what evidence there is for evolution, study fossils and extinction. They will also study antibiotic resistant bacteria and classification of organisms.* **Adaptations, interdependence and competition** *Students focus on communities and how organisms interact with their environment. They look at competition in animals and plants and how they have adapted.*	**Force and motion** *In this topic, students focus on weight as a force and braking. They learn what braking distance is and what it is composed of.* **Organising an ecosystem** *Students study feeding relationships and the carbon cycle.* **Biodiversity and ecosystems** *Students will study pollution on land, water and in the air. They will learn more about deforestation and global warming.* **The Earths atmosphere** *Students learn about how the atmosphere developed over time and greenhouse gases, focusing on global climate change and atmospheric pollutants.* **Wave properties** *Students study the different waves that exist and their properties. They focus on reflection and refraction of waves* **Electromagnetic waves** *Students will study the electromagnetic spectrum and the uses of different waves such as UV waves, X-rays and gamma rays.* **Chemical analysis** *Students will apply prior knowledge of separating mixtures to deepen their learning on chromatograms and learn different tests for gases.* **Electromagnetism** *Building on their knowledge of electromagnetic waves, students study magnetic fields and those of electric currents. They study the motor effect as well.*	**Mocks** **Revision** **Required practicals**	**Revision** **Required practicals** **GCSE's**	**GCSE's**