CURRICULUM PLANS

BIOLOGY YEAR 7

AUTUMN 1		AUTUMN 2	SPRING 1	SPRING 2	SUMMER 1	SUMMER 2	AREs
TOPIC 1: INTRO TO SCIENCE MOVING ONTO NON ARE PRACTICAL SCIENCE BASICS **Big question(s) of the unit:** How do I perform an experiment? **Overview of knowledge, understanding and skills (key concepts):** **Knowledge:** • How to work safely in a lab • Identifying and describing hazard symbols. • How to label and use a Bunsen burner. • What are variables when carrying out an experiment. **Understanding:** • How to read scales and understanding measuring units. Understanding what safety and roaring flames are used for when using a Bunsen Burner. Identifying variables in different experimental scenarios. **Skills:** • Research skills – researching potential careers in science. • Practical skills – using a Bunsen Burner. • Practical skills – identifying lab equipment. • Maths skills – units of measurement. • Teamwork skills – working in pairs for practical work. • Problem solving skills - applying knowledge to practical problems.	TOPIC 2: ARE 1: STRUCTURE AND FUNCTION OF LIVING ORGANISMS **Big question(s) of the unit:** How do cells and tissues work together in organisms? **Overview of knowledge, understanding and skills (key concepts)** **Knowledge:** • Structure and function of animal and plant cells. The hierarchal organisation of multicellular organisms. Structure and function of the human skeleton. The function of muscles **Understanding:** • Why cells are the fundamental unit of living organisms. How muscles work with the skeleton for movement of the human body. How the microscope has increased our scientific knowledge. **Skills:** • Practical skills – using a microscope • Practical skills – building models to represent scientific processes.	TOPIC 3: ARE 2 PHYSICS UNIT (FORCES) TOPIC 4: ARE 3 CHEMISTRY UNIT (PARTICULATE NATURE OF MATTER)	TOPIC 5: ARE 4 REPRODUCTION **Big question(s) of the unit:** How do plants and animals reproduce? **Overview of knowledge, understanding and skills (key concepts):** **Knowledge:** • Structure and function of reproductive organs in humans. Structure and function of reproductive organs in plants. What is the menstrual cycle? **Understanding:** • The process of fertilisation in plants and in humans. The stages of gestation in humans. Effects of maternal lifestyle on pregnancy . Different methods of pollination and seed dispersal **Skills:** • Practical skills – flower dissection • Practical skills – germinating seeds • Using key scientific language in explanations.	TOPIC 6: ARE 5: PHYSICS UNIT (WAVES)	TOPIC 7 ARE 6 CHEMISTRY UNIT (EARTH AND ATMOSPHERE)	TOPIC 8 NON – ARE UNIT (RECAP AND CONSOLIDATION OF PRACTICAL SKILLS IN SCIENCE) **Big question(s) of the unit:** What is the scientific method? **Overview of knowledge, understanding and skills (key concepts):** **Knowledge:** • How to draw a line graph, how to draw a bar graph, identifying practical equipment **Understanding:** • How to plan an experiment correctly, how to identify variables in an experiment, why it is necessary to have only one independent variable in an experiment **Skills:** • Measuring, analysing and interpretation of data, graph drawing, handling of scientific equipment, safety in the lab MOVE ONTO YEAR 8 CURRICULUM	**ARE 1: How do cells and tissues work together in organisms?** I can describe the structure and function of cells and their organelles. I can describe and explain the adaptations and functions of the digestive and musculoskeletal systems in humans. **ARE 4: How do plants and animals reproduce?** I can identify the reproductive organs of humans and plants and describe their functions. I can explain the process of fertilisation in plants and humans.

CURRICULUM PLANS

BIOLOGY YEAR 8

AUTUMN 1	AUTUMN 2	SPRING 1	SPRING 2	SUMMER 1	SUMMER 2	AREs
TOPIC 1: ARE 1 CHEMISTRY UNIT (PERIODIC TABLE AND ATOMIC STRUCTURE) TOPIC 2: ARE 2 GENETICS AND EVOLUTION **Big question(s) of the unit:** How we inherit our characteristics? **Overview of knowledge, understanding and skills (key concepts):** **Knowledge:** • Recall functions of organelles in cells and recall different genetic terminology. Recall how DNA was discovered. **Understanding:** • Explain how characteristics are inherited. • Explain the difference between inherited and environmental characteristics. Explain how adaptation to environment and competition can result in natural selection. Explain how natural selection can lead to evolution. Link evolution to species and species to biodiversity. **Skills:** • Literacy: translate definitions of keywords. Analysing images of species for similarities and differences. Evaluate evidence for evolution from different sources. Evaluate negative and positive human impacts on biodiversity.	TOPIC 3: ARE 3 PHYSICS UNIT (ENERGY) TOPIC 4: ARE 4 CHEMISTRY UNIT CHEMICAL REACTIONS	TOPIC 5: ARE 5 PHYSICS UNIT (ELECTRICITY AND MAGNETISM)	TOPIC 6: ARE 6 BIOLOGY (INTERDEPENDENCE) **Big question(s) of the unit:** How do different organisms interact with each other and the environment? **Overview of knowledge, understanding and skills (key concepts):** **Knowledge:** • Describe different interactions of organisms using food webs and food chains, including how energy is transferred in a food chain. Recall different interdependence terminology. Why plants needs nutrients. **Understanding:** • Explain how organisms can be affected by each other and their environment, through processes such as bioaccumulation, global warming, predation. What is the purpose of glucose in plants. **Skills:** • Discussion skills around the importance of pollinating insects and how their disappearance will affect other organisms, including humans. Drawing food chains and food webs. Literacy: translate definition of keywords.	TOPIC 7: NON –ARE 1 BIOLOGY UNIT (HEALTH) **Big question(s) of the unit:** How can drugs affect my health? **Overview of knowledge, understanding and skills (key concepts):** **Knowledge:** • What is good health. What is a drug. The difference between medicinal, recreational, legal and illegal drugs. **Understanding:** • The effect of drugs on our bodies. Different classifications of recreational drugs. **Skills:** • Collecting and Understanding data.	TOPIC 8 - NON-ARE 2: PHYSICS UNIT (ENERGY IN THE HOME) TOPIC 9 NON – ARE UNIT 3 (RECAP AND CONSOLIDATION OF PRACTICAL SKILLS IN SCIENCE) **Big question(s) of the unit:** What is the scientific method? **Overview of knowledge, understanding and skills (key concepts):** **Knowledge:** • How to draw a line graph, how to draw a bar graph, identifying practical equipment. **Understanding:** • How to plan an experiment correctly, how to identify variables in an experiment, why it is necessary to have only one independent variable in an experiment. **Skills:** • Measuring, analysing and interpretation of data, graph drawing, handling of scientific equipment, safety in the lab. MOVE ONTO Y9 CURRICULUM	**ARE 2: How do we inherit our characteristics?** I can explain how characteristics are inherited. I can link adaptations to natural selection and evolution. **ARE 5: How do different organisms interact with other and the environment?** I can describe how organisms interact with each other through food chains and food webs. I can explain how organisms populations can be affected by the environment and other organisms.

CURRICULUM PLANS

BIOLOGY YEAR 9

AUTUMN 1	AUTUMN 2	SPRING 1	SPRING 2	SUMMER 1	SUMMER 2	PQEs
TOPIC 1: PQE 1 CELLS AND ORGANSIATION TOPIC 2: PQE 2: NUTRITION AND DIGESTION **Big question(s) of the unit:** PQE 1: What are living things made from? **Overview of knowledge, understanding and skills (key concepts):** **Knowledge:** • Multicellular and unicellular cells, including their organelles and function of organelles Structure and function of DNA **Understanding:** • Differences between eukaryotic and prokaryotic cells. **Skills:** • Producing sample slides for use with microscopes, using a microscope, model building. Calculating magnification. Using standard form in science. **Big question(s) of the unit:** PQE 2: How do we get nutrients from our food? **Overview of knowledge, understanding and skills (key concepts):** **Knowledge:** • Digestive system organs and their functions. Adaptations of villi. Importance of bacteria in the digestive system. **Understanding:** • The role of enzymes in digestion and factors that can affect their activity. **Skills:** • Practical skills, looking at how temperature and pH affect enzyme activity, graph analysis.	TOPIC 2: PQE 2 CONTINUTED MOVING ON TO TOPIC 3: PQE3: PHOTOSYNTHESIS **Big question(s) of the unit:** PQE 3: How do plants live if they can't eat? **Overview of knowledge, understanding and skills (key concepts):** **Knowledge:** • What photosynthesis is, where it happens in the plant, the reactants and products of photosynthesis **Understanding:** • Adaptations of the leaf for photosynthesis, limiting factors of photosynthesis. The importance of photosynthesis to human life **Skills:** • Practical skills – testing a leaf for starch, investigating the effect of light intensity on the rate of photosynthesis. Writing word and balanced symbol equations	TOPIC 4: **PQE 4: respiration.** **Big question(s) of the unit:** Why do we have to eat and breathe? **Overview of knowledge, understanding and skills (key concepts):** **Knowledge:** The processes of aerobic and anaerobic respiration, where they happen and their reactants and products. **Understanding:** The difference between aerobic and anaerobic respiration, anaerobic respiration in yeast as fermentation, and its uses. Purpose of aerobic and anaerobic respiration in humans and animals. **Skills:** **Practical skills** - Investigating the effect of temperature on the rate of anaerobic respiration, writing word and balanced symbol equations.	TOPIC 5: **PQE 5: gas exchange.** **Big question(s) of the unit:** How do we get the oxygen we need for aerobic respiration? **Overview of knowledge, understanding and skills (key concepts):** **Knowledge:** Structure and function of the human respiratory system, including adaptations of alveoli. **Understanding:** Mechanism of breathing, including pressure and volume changes, the importance of exchange surfaces in larger organisms, the impact of exercise, smoking and asthma on breathing in humans. **Skills:** Calculation of surface area to volume ratios.	TOPIC 6: **PQE 6: movement of substances.** **Big question(s) of the unit:** Unit B1: How do our cells get the things they need? **Overview of knowledge, understanding and skills (key concepts):** **Knowledge:** The processes of diffusion, osmosis and active transport, including examples of where and why they happen. **Understanding:** Factors that can affect the rate of diffusion, the effect of solute concentration on osmosis. **Skills:** Practical skills, investigating the effect of solute concentration on the mass of potatoes (osmosis practical).	TOPIC 7: **getting ready for CGSE biology unit B1.** Recap of scientific method, numeracy skills, and key biology concepts including respiration, photosynthesis, enzymes and cell structure.	**PQE 1: What are living things made from?** I can describe differences between multicellular and unicellular organsims. I can describe the differences between eukaryotic and prokaryotic cells. I can use a microscope. **PQE 2: How do we get the nutrients from our food?** I can identify the organs of the digestive system and describe their functions. I can explain the importance of bacteria in the digestive system. I can describe how enzymes work. **PQE3: How do plants live if they can't eat?** I can describe the process of photosynthesis. I can explain factors that affect the rate of photosynthesis. **PQE 4: Why do we have to eat and breathe?** I can describe the processes of anaerobic and aerobic respiration in animals, plants and microorganisms. **PQE 5: How do our cells get the things they need?** I can describe the processes of diffusion, active transport and osmosis, and factors that can affect them. **PQE 6: How do we get the oxygen we need for aerobic respiration?** I can describe the structure and function of the human respiratory system. I can explain the importance of exchange surfaces in multicellular organisms.

CURRICULUM PLANS

BIOLOGY YEAR 10

AUTUMN 1	AUTUMN 2	SPRING 1	SPRING 2	SUMMER 1	SUMMER 2
Big question(s) of the unit: Unit B2: How do cells and organ systems work to keep organisms alive? **Overview of knowledge, understanding and skills (key concepts):** **Knowledge:** What mitosis and the cell cycle are, what stem cells are (embryonic, adult and plant), how materials move in cells. **Understanding:** The purpose of different stages of the cell cycle, how cancer forms, factors that affect diffusion, osmosis and active transport, how stem cells are used 'in nature' and in medicine. **Skills:** Numeracy skills - calculation of surface area to volume ratios. Debating skills - ethics behind stem cell research and use in medicine.	**Big question(s) of the unit:** Unit B2: How do cells and organ systems work to keep organisms alive? **Overview of knowledge, understanding and skills (key concepts):** **Knowledge:** Identifying different exchange surfaces and their adaptations. The structure and function of the circulatory system. The structure and function of transpiration systems in plants. **Understanding:** The purpose of exchange surfaces and their adaptations. The journey of blood through the heart. Factors that affect the rate of transpiration, plant adaptations for transpiration. **Skills:** Practical skills - dissection of a sheep heart - use of a potometer.	**Big question(s) of the unit:** Unit B3: How do organisms control their body systems? **Overview of knowledge, understanding and skills (key concepts):** **Knowledge:** The structure and function of the nervous system. The structure and function of the endocrine system. **Understanding:** How the body uses normal and reflex responses to respond to stimuli in the environment. The role of different hormones in the body. **Skills:** Life skills - how to maintain a healthy body to prevent disease.	**Big question(s) of the unit:** Unit B3: How do organisms control their body systems? **Overview of knowledge, understanding and skills (key concepts):** **Knowledge:** Identifying hormones that control blood glucose levels. Events during the female menstrual cycle. Methods of contraception and fertility treatment. The role of thyroxine (higher only). **Understanding:** How hormones regulate blood sugar levels, and what happens when they don't work (diabetes). How hormones regulate the menstrual cycle. How hormones regulate metabolism (higher only). **Skills:** Evaluation skills (evaluation of the effectiveness of different contraception). Life skills - how to discuss fertility issues.	**Big question(s) of the unit:** Unit B4 How does the environment affect living things? **Overview of knowledge, understanding and skills (key concepts):** **Knowledge:** Details of the carbon cycle, nitrogen cycle, and water cycle. Examples of abiotic and biotic factors. **Understanding:** The purpose of the carbon, nitrogen and water cycles, the different stages of them, the effect of abiotic and biotic factors in the cycles. **Skills:** Analysing and articulating cycle diagrams. Measuring skills (abiotic factors). Practical skills - identifying equipment to use to measure abiotic factors. **Overview of knowledge, understanding and skills (key concepts):** **Knowledge:** What ecosystems are, how organisms interact with abiotic and biotic factors in ecosystems. **Understanding:** How predator and prey populations affect each other, different forms of competition in ecosystems. **Skills:** Graph reading skills (predator prey relationships).	**Big question(s) of the unit:** Unit B5: How do organisms pass on their genes? **Overview of knowledge, understanding and skills (key concepts):** **Knowledge:** Key terminology - heterozygous, homozygous, phenotype, genotype, allele, dominant, recessive, gene, chromosome, haploid, diploid, mutation. **Understanding:** Using genetic crosses/Punnett squares to show single gene inheritance and sex determination. Understanding that most phenotypic features are caused by multigene inheritance. Understanding that not all mutations are disadvantages or advantageous. **Skills:** Probability calculations as ratios.

CURRICULUM PLANS

BIOLOGY YEAR 11

AUTUMN 1	AUTUMN 2	SPRING 1	SPRING 2	SUMMER 1	SUMMER 2
Big question(s) of the unit: Unit B5: How do organisms evolve? **Overview of knowledge, understanding and skills (key concepts):** **Knowledge:** How Darwin's theory of evolution through natural selection works to show the evolution of a number of different species. **Understanding:** How variation, selection, competition, and inheritance lead to the evolution of new species. How the fossil record and antibiotic resistance in bacteria are evidence for evolution. **Skills:** Navigation of the ethical/religious aspect to evolution 'belief'.	**Big question(s) of the unit:** Unit B6: How do humans interact with their environment? **Overview of knowledge, understanding and skills (key concepts):** **Knowledge:** Positive and negative human impacts on ecosystems. Manipulation of the environment (selective breeding and genetic engineering) to benefit humankind. **Understanding:** The processes of genetic engineering and selective breeding, including understanding of the risks and benefits. **Skills:** Sampling techniques, multi-step calculations, use of population estimate equations, interpretation of kite diagrams.	**Big question(s) of the unit:** Unit B6: How do diseases happen and how can we prevent and treat them? **Overview of knowledge, understanding and skills (key concepts):** **Knowledge:** What communicable and non-communicable diseases are, including examples in both plants and animals. **Understanding:** Ways to prevent the spread of communicable diseases, how vaccination works, treatment for non-communicable diseases (esp CVD), process of making new medicines, genome research and its impact on medicine, stem cell use in medicine. **Skills:** Practical skills: investigating antimicrobials. Numeracy: Measuring diameters, use of equations. Ethics: around human genome research and stem cell use.	REVISION OF B1- B6 UNITS	REVISION OF B1- B6 UNITS	EXTERNAL EXAMINATION PERIOD