

OVERVIEW

At The Lowry Academy our aim is to ensure all children are scientifically literate individuals who can critically evaluate information to make informed decisions about their lives. At The Lowry Academy we equip pupils with both the knowledge and skills to understand the world around them and develop curiosity. A wealth of opportunities to learn about our local and diverse scientific community shows every child how they can involve science in their future, should they wish to. **In Year 10, students will cover a variety of different topics from the three different disciplines of science; Biology, Chemistry and Physics. The Biology topics are cells, organisation, infection and response and bioenergetics. The Chemistry topics are atomic structure and periodic table, bonding, quantitative chemistry, chemical changes and energy changes. The Physics topics are, energy, electricity, particle model and atomic structure.**

AUTUMN

Biology:

B1 – Cell Biology: Students explore how structural differences between types of cells enables them to perform specific functions within the organism. These differences in cells are controlled by genes in the nucleus. Students learn that for an organism to grow, cells must divide by mitosis producing two new identical cells and if cells are isolated at an early stage of growth before they have become too specialised, they can retain their ability to grow into a range of different types of cells.

B2 – Organisation: In this section we will learn about the human digestive system which provides the body with nutrients, and the respiratory system that provides it with oxygen and removes carbon dioxide. We look at how improved diet and lifestyle can affect an individual's risk of getting coronary heart disease. We will also learn how the plant's transport system is dependent on environmental conditions to ensure that leaf cells are provided with the water and carbon dioxide that they need for photosynthesis.

Chemistry:

C1 – Atomic Structure and The Periodic Table: The historical development of the periodic table and models of atomic structure provide good examples of how scientific ideas and explanations develop over time as new evidence emerges. The arrangement of elements in the modern periodic table can be explained in terms of atomic structure which provides evidence for the model of a nuclear atom with electrons in energy levels.

Physics:

P1 – Energy: In this section students will recap basics of energy transfers and pathways. This will then lead on to calculating kinetic, gravitational potential and elastic potential energy. Students will learn about specific heat capacities of substances and that they can differ between types of materials. Finally students will learn about the different types of energy, renewable and non-renewable.

Assessment

Each topic has an end of unit test.

Fluency is completed once a week which is based on skills.

Personal Development

Students learn about the use of stem cells and the ethical issues behind this.

SPRING

Mid-year Assessments

Biology:

B3 – Infection and Response: Students learn that pathogens are microorganisms such as viruses and bacteria that cause infectious diseases in animals and plants. They depend on their host to provide the conditions and nutrients that they need to grow and reproduce. They frequently produce toxins that damage tissues and make us feel ill. This topic explores how we can avoid diseases by reducing contact with them, as well as how the body uses barriers against pathogens. Once inside the body our immune system is triggered which is usually strong enough to destroy the pathogen and prevent disease. When at risk from unusual or dangerous diseases our body's natural system can be enhanced by the use of vaccination.

Chemistry:

C2 – Structure and Bonding: Students learn how chemists use theories of structure and bonding to explain the physical and chemical properties of materials. Analysis of structures shows that atoms can be arranged in a variety of ways, some of which are molecular while others are giant structures. In this section we teach how scientists use this knowledge of structure and bonding to engineer new materials with desirable properties.

C3 – Quantitative Chemistry: Chemists use quantitative analysis to determine the formulae of compounds and the equations for reactions. Given this information, analysts can then use quantitative methods to determine the purity of chemical samples and to monitor the yield from chemical reactions. Chemical equations provide a means of representing chemical reactions and are a key way for chemists to communicate chemical ideas.

Physics:

P2 – Electricity: In this topic students learn that electric charge is a fundamental property of matter everywhere. Electrical current is a flow of charge. Students are taught, through practical investigations, the link between current, potential difference and resistance. Students study the UK mains electricity and learn that it is an AC supply in the UK. Students are taught that the domestic electricity supply has a frequency of 50Hz and is about 230V. The final section of the unit looks at how electricity is transmitted in the national grid.

Assessment

Each topic has an end of unit test.

Fluency is completed once a week which is based on skills.

Personal Development

Students learn how to rewire a 3 pin plug.

Students also learn how vaccines work.

SUMMER

End of Year Assessments

Biology:

B4 – Bioenergetics: In this section we will explore how plants harness the Sun's energy in photosynthesis in order to make food. This process liberates oxygen which has built up over millions of years in the Earth's atmosphere. Both animals and plants use this oxygen in a process called aerobic respiration which transfers the energy that the organism needs to perform its functions. Conversely, anaerobic respiration does not require oxygen to transfer energy.

B7 – Ecology: In this section we learn about different materials are cycled, including carbon and water that are continually recycled by the living world, being released through respiration of animals, plants and decomposing microorganisms and taken up by plants in photosynthesis. All species live in ecosystems composed of complex communities of animals and plants dependent on each other and that are adapted to particular conditions, both abiotic and biotic. In this section we will explore how humans are threatening biodiversity as well as the natural systems that support it.

Chemistry:

C4 – Chemical Changes: Students learn about the different types of chemical changes and reactions that can occur. Knowing about these different chemical changes allows students to predict exactly what new substances would be formed. It also helps students to understand the complex reactions that take place in living organisms. The extraction of important resources from the earth makes use of the way that some elements and compounds react with each other and how easily they can be 'pulled apart'.

C5 – Energy Changes: In this section we explore how the interaction of particles often involves transfers of energy due to the breaking and formation of bonds. Reactions in which energy is released to the surroundings are exothermic reactions, while those that take in thermal energy are endothermic. Some interactions between ions in an electrolyte result in the production of electricity. Cells and batteries use these chemical reactions to provide electricity.

Physics:

P4 – Particle Model: Students learn that ionising radiation is hazardous but can be very useful. The ionization and penetrating power of alpha, beta and gamma sources are investigated and the methods of storing these radioactive sources is taught. We look into how nuclear physics has helped us come up with the structure of the atom as we know it. In this topic half-life is explained and students are able to calculate half-lives from graphs.

Assessment

Each topic has an end of unit test.

Fluency is completed once a week which is based on skills.

Personal Development

Students learn the effects of global warming on biodiversity in plants and animals.

Students also learn nuclear radiation and the dangers of it.

Useful resources for supporting your child at home

Seneca – There are quizzes on www.senecalearning.com that align with all the units we study in Year 10. This will allow your child to quiz themselves to improve their ability to remember knowledge and test their exam skills.

Knowledge Organiser – The science knowledge organiser contains all the key definitions students need to know for each unit. You could test your child on their ability to remember these facts, or get your child to self-quiz using the 'Look, Cover, Write, Check' technique.

Homework