Science
Year 10

Irlam and Cadishead Academy
The best in everyone™
Part of United Learning

OVERVIEW

Our KS4 science curriculum has been designed to provide students with a deep understanding of the scientific knowledge and ideas that impact them as individuals. As they move through the KS4 curriculum, students will be increasingly supported in developing their curiosity, provided with insight into working scientifically and develop an appreciation of the value of science in their everyday lives.

In Year 10, students will build upon key concepts covered during KS3 across all three disciplines. For example, in Biology B2 Organisation, students will continue to learn about structural hierarchies within living organisms which they first covered during 7BC Cells and later in 9BB Biological Systems & Processes. This continuation of knowledge also occurs in Physics when students link core ideas around series and parallel circuits from 7PE Energy to the relationship between current and potential difference during P2 Electricity.

Autumn

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.
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: 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.
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.

Personal development:
Connects physics to global issues such as climate change and sustainability, building awareness of energy use in society.

Assessment:
End of Topic Tests for each unit.
Fluency once a week to support development of key skills.
Mid-year Assessments

Spring

Mid-year Assessments
Biology: B2 – Organisation: In this section we 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 also learn how the plant's transport system is dependent on environmental conditions to ensure that cells are provided with the water and carbon dioxide that they need for photosynthesis.
B3 – Infection and Response: Students learn that pathogens such as viruses and bacteria cause infectious diseases in animals and plants. 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. When at risk from unusual or dangerous diseases our body's natural system can be enhanced by the use of vaccinations.
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.
Chemistry: C4 – Chemical Changes: Students learn about 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'.

Personal development:
Connects biology to real-life health decisions, developing awareness of diet, lifestyle, and disease prevention, including learning the importance of vaccinations to prevent deadly diseases.

Assessment:
End of Topic Tests for each unit.
Fluency once a week to support development of key skills.

Summer

End of Year Assessments
Biology: 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:
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 – Atomic Structure: 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 can calculate half-lives from graphs.
P7 – Magnetism: Electromagnetic effects are used in a wide variety of devices. Engineers make use of the fact that a magnet moving in a coil can produce electric current.

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

Assessment:
End of Topic Tests for each unit.
Fluency once a week to support development of key skills.
End of Year Assessments

Homework
Sparx Homework is expected to be completed weekly, alongside paper exam questions where relevant

Useful resources for supporting your child at home
Sparx Science Flashcards
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.
Science Padlet available on KS4 area of ICA website