Cornwallis Academy
Ambitions for All

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Year 8 Science

Periodic Table and Elements

Learning Objectives

This topic focuses on understanding the structure and patterns of the periodic table, as well as the differences between elements, compounds, and mixtures. Students will explore how elements are arranged into groups and periods, identify patterns in physical and chemical properties, and study important groups such as alkali metals, halogens, and noble gases. Learners will also investigate atoms, molecules, compounds, and polymers, use particle diagrams to classify substances, and learn how to name simple compounds and interpret chemical formulae.

What previous knowledge is required?

Students should already know that materials are made from particles and understand the basic differences between solids, liquids, and gases. They should also have simple knowledge of elements, compounds, chemical symbols, and basic chemical reactions.

How will this topic's content help with future learning?

All content in KS3 is part of a spiral curriculum set out by AQA (the exam board chosen by Cornwallis Academy for GCSE Science). All of KS3 forms the foundation of knowledge for GCSE study.

Common Misconceptions

Common misconceptions include thinking compounds and mixtures are the same, believing atoms can be seen with a normal microscope, or confusing molecules with compounds. Students may also think all elements in the same group have identical properties, misunderstand that metals are always magnetic, or confuse periods and groups on the periodic table.

National Curriculum / Specification

3.5.3 Periodic Table and Elements

Breathing and Digestion

Learning Objectives

This topic focuses on understanding the respiratory and digestive systems and how they help the body function. Students will learn how gas exchange takes place in the lungs, how breathing is controlled, and how oxygen is used in respiration. Learners will also explore the importance of a balanced diet, the roles of different nutrients, and how the digestive system breaks down and absorbs food for energy, growth, and repair.

What previous knowledge is required?

Students should already know that living things need food, water, and oxygen to survive, and understand basic body parts such as the lungs, stomach, and heart. They should also have simple knowledge of healthy eating and that food provides energy for the body.

How will this term's content help with future learning?

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Common Misconceptions

Common misconceptions include thinking breathing and respiration are the same process, believing air only contains oxygen, or assuming gas exchange happens in the mouth rather than the alveoli. Students may also think all fats are unhealthy, confuse digestion with absorption, or believe food goes directly into the bloodstream without being broken down first.

National Curriculum / Specification

3.8.3 Breathing, 3.8.4 Digestion

Separation Techniques

Learning Objectives

This topic focuses on understanding the difference between pure substances and mixtures, and how mixtures can be separated using differences in physical properties. Students will explore solutions, solutes, and solvents, and

investigate separation techniques such as filtration, distillation, evaporation, and chromatography. Learners will also study how properties such as solubility and boiling point affect the methods used to separate substances.

What previous knowledge is required?

Students should already know the basic properties of solids, liquids, and gases, and understand simple ideas about mixing substances. They should also have basic laboratory skills and experience observing changes when substances dissolve or are heated.

How will this term's content help with future learning?

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Common Misconceptions

Common misconceptions include thinking dissolving is the same as melting, believing mixtures and compounds are the same, or assuming a dissolved substance has disappeared completely. Students may also confuse evaporation with boiling, misunderstand how filtration works, or think pure substances always contain only one element rather than one type of substance.

National Curriculum / Specification

3.5.2 Separating Mixtures

Magnets and Electromagnets

Learning Objectives

This topic focuses on understanding magnets, magnetic fields, and electromagnets. Students will explore how magnetic forces act at a distance, how magnetic fields can be represented using field lines, and how magnets attract or repel depending on their poles. Learners will also investigate how electromagnets are created using electric current in a solenoid, and how factors such as current, number of coils, and the iron core affect the strength of the magnetic field.

What previous knowledge is required?

Students should already know that magnets can attract and repel certain materials and understand simple ideas about forces and electricity. They should also have basic knowledge of circuits, including that electric current can flow through wires.

How will this term's content help with future learning?

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Common Misconceptions

Common misconceptions include thinking all metals are magnetic, believing magnets only attract and never repel, or assuming magnetic fields can only exist when objects are touching. Students may also think electromagnets stay magnetic when the current is switched off, or misunderstand that stronger magnets create larger rather than stronger magnetic fields.

National Curriculum / Specification

3.2.3 Electromagnets, 3.2.4 Magnetism

Light

Learning Objectives

This topic focuses on understanding how light travels, reflects, and refracts through different materials. Students will explore how light behaves when it meets different media, including reflection from mirrors, refraction through lenses and prisms, and how absorption and scattering affect what we see. Learners will use ray diagrams to model the formation of images and investigate how transparent, translucent, and opaque materials interact with light, as well as how lenses and the eye help form images on the retina.

What previous knowledge is required?

Students should already know that light travels in straight lines and enables us to see objects. They should also have simple knowledge of sources of light, shadows, basic properties of materials, and measuring angles.

How will this term's content help with future learning?

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Common Misconceptions

Common misconceptions include thinking light only exists when it can be seen, believing mirrors reverse images top-to-bottom instead of left-to-right, or confusing reflection with refraction. Students may also think transparent objects do not absorb any light, misunderstand why objects appear different colours, or believe light slows down because it is “weaker” in denser materials.

National Curriculum / Specification

3.4.2 Light

Forces and Pressure

Learning Objectives

This topic focuses on understanding forces, pressure, and how they affect the motion and shape of objects. Students will explore balanced and unbalanced forces, equilibrium, friction, tension, and compression, and learn how forces can change an object’s movement or cause deformation. Learners will also investigate pressure in solids, liquids, and gases, including how pressure increases with depth in fluids, how upthrust affects floating and sinking, and how to calculate pressure using force and area.

What previous knowledge is required?

Students should already know that forces are pushes and pulls that can change movement, and understand simple ideas about gravity and friction. They should also have basic measurement and graph skills, and know the differences between solids, liquids, and gases.

How will this topic's content help with future learning?

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Common Misconceptions

Common misconceptions include thinking a force is needed to keep an object moving at constant speed, or confusing balanced forces with no forces at all. Students may also believe heavier objects always fall faster, misunderstand that pressure only acts downward in liquids and gases, or think floating objects have no weight.

National Curriculum / Specification

3.1.3 Contact Forces, 3.1.4 Pressure

Climate and Earth’s Atmosphere

Learning Objectives

This topic focuses on understanding how Earth's resources are used and managed, and how human activities affect the environment. Students will explore the carbon cycle, including processes such as photosynthesis, respiration, and the burning of fossil fuels, and investigate how greenhouse gases contribute to global warming and climate change. Learners will also examine natural resources, metal extraction from ores, recycling, and the methods used to obtain metals, including carbon displacement and electrolysis, while considering the importance of conserving finite resources.

What previous knowledge is required?

Students should already know that plants use photosynthesis, living things carry out respiration, and fuels release energy when burned. They should also have basic knowledge of elements, compounds, chemical reactions, and simple environmental concepts such as pollution and recycling.

How will this topic's content help with future learning?

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Common Misconceptions

Common misconceptions include thinking the ozone layer causes global warming, believing carbon dioxide is the most abundant gas in the atmosphere, or assuming all greenhouse gases are harmful in every amount. Students may also think resources are unlimited, confuse recycling with reusing, or believe all metals can be extracted in the same way regardless of their reactivity.

National Curriculum / Specification

3.7.3 Climate, 3.7.4 Earth Resources

Evolution and Inheritance

Learning Objectives

This topic focuses on understanding inheritance, evolution, and biodiversity. Students will explore how genetic information is passed from parents to offspring through genes, DNA, and chromosomes, and how inherited variation exists within populations. Learners will investigate the theory of evolution by natural selection, examining how species adapt over time, why extinction occurs, and why biodiversity is important for maintaining healthy ecosystems and supporting life on Earth.

What previous knowledge is required?

Students should already know that living things reproduce and pass characteristics to their offspring and understand that individuals within a species can show variation. They should also have basic knowledge of habitats, ecosystems, and how organisms depend on their environment for survival.

How will this topic's content help with future learning?

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Common Misconceptions

Common misconceptions include thinking individuals evolve during their lifetime rather than populations changing over generations/millennia, believing evolution happens because organisms “choose” to adapt, or confusing inherited characteristics with traits caused by the environment. Students may also think genes, DNA, and chromosomes are different substances rather than related structures, or assume biodiversity only means the number of animals in an ecosystem.

National Curriculum / Specification

3.10.3 Evolution,, 3.10.4 Inheritance

Work, Conduction and Convection

Learning Objectives

This topic focuses on understanding how forces transfer energy through work and how thermal energy moves between objects. Students will explore how work is done when a force moves an object, how simple machines such as levers, pulleys, and wheels make tasks easier, and how force and distance affect the amount of work done. Learners will also investigate thermal energy, temperature, and the ways heat is transferred by conduction, convection, and radiation, while comparing the properties of thermal conductors and insulators.

What previous knowledge is required?

Students should already know that forces can cause objects to move and that energy is needed to make things happen. They should also understand basic ideas about heating and cooling, particle movement in solids, liquids, and gases, and simple energy transfers in everyday situations.

How will this topic's content help with future learning?

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Common Misconceptions

Common misconceptions include thinking work is done whenever a force is applied, even if nothing moves, or confusing force with energy. Students may also believe temperature and thermal energy are the same thing, think cold can be transferred between objects, or misunderstand that heat only travels by conduction. Another common misconception is that insulators stop heat transfer completely rather than simply slowing it down.

National Curriculum / Specification

3.3.3 Work, 3.3.4 Heating and Cooling

Waves

Learning Objectives

This topic focuses on understanding how waves transfer energy without transferring matter. Students will explore the properties of sound waves and transverse waves, including amplitude, frequency, wavelength, speed, reflection, and transmission. Learners will investigate how sound travels as a pressure wave, how microphones and loudspeakers convert sound and electrical signals, and how higher-frequency waves such as ultrasound and ultraviolet radiation differ from those detectable by humans.

What previous knowledge is required?

Students should already know that sound is produced by vibrations and that light and sound can travel as waves. They should also have basic knowledge of energy transfer, particle behaviour, and simple wave properties such as loudness and pitch.

How will this topic's content help with future learning?

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Common Misconceptions

Common misconceptions include thinking waves transfer matter rather than energy, believing particles travel with the wave instead of vibrating in place, or confusing amplitude with frequency. Students may also think louder sounds travel faster, assume all waves require a medium to travel through, or confuse ultrasound and ultraviolet because of their similar names.

National Curriculum / Specification

3.4.3 Wave Effects, 3.4.4 Wave Properties

Chemical Energy and Types of Reaction

Learning Objectives

This topic focuses on understanding chemical reactions and the energy changes that occur during them. Students will explore processes such as combustion and thermal decomposition, learning how reactants are rearranged to form new products while conserving the total number of atoms. Learners will also investigate exothermic and endothermic reactions, understand how chemical bonds are broken and formed, and use word equations to represent chemical changes and the role of catalysts in speeding up reactions.

What previous knowledge is required?

Students should already know the difference between elements, compounds, and mixtures, and understand that chemical reactions produce new substances. They should also have basic knowledge of particles, atoms, energy transfer, and simple word equations.

How will this topic's content help with future learning?

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Common Misconceptions

Common misconceptions include thinking atoms are created or destroyed during a chemical reaction, believing energy is produced rather than transferred, or confusing chemical changes with physical changes. Students may also think bond breaking releases energy (rather than requiring energy), misunderstand the difference between exothermic and endothermic reactions, or believe catalysts are used up during a reaction.

National Curriculum / Specification

3.6.3 Chemical Energy, 3.6.4 Earth Resources

Respiration and Photosynthesis

Learning Objectives

This topic focuses on understanding how living organisms obtain and use energy through respiration and photosynthesis. Students will explore how cells break down glucose during aerobic and anaerobic respiration to release energy and investigate the products of these processes. Learners will also study how plants and algae use light energy, carbon dioxide, and water to produce glucose through photosynthesis, the adaptations that enable this process, and how glucose is used for growth, energy, and storage.
What previous knowledge is required?
Students should already know that living things need energy to survive and grow, and that plants and animals have different ways of obtaining food. They should also have basic knowledge of cells, gases such as oxygen and carbon dioxide, and simple ideas about plant structure and nutrition.
How will this topic's content help with future learning?
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Common Misconceptions
Common misconceptions include thinking plants only carry out photosynthesis and do not respire, believing respiration is the same as breathing, or assuming plants get their food from the soil. Students may also think photosynthesis occurs all the time regardless of light, confuse aerobic and anaerobic respiration, or believe oxygen is produced during respiration rather than used in aerobic respiration.
National Curriculum / Specification
3.9.3 Respiration. 3.9.4 Photosynthesis
Moja Island
Learning Objectives
This topic focuses on linking various pieces of knowledge from throughout Year 7 and 8 content and apply it into a specific scenario across several lessons. This includes density, distillation, variation, food chains, energy stores, ecosystems and circuits. It also builds in pre-GCSE content to help with progression, including how to build a plug.
What previous knowledge is required?
Year 7 and 8 content.
How will this topic's content help with future learning?
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Common Misconceptions
Please see the rest of this document and the Year 7 document.
National Curriculum / Specification
2.1 – 2.16 Enquiry Processes