|  |  |  |  |
| --- | --- | --- | --- |
|  | **Biology** | **Chemistry** | **Physics** |
| **Year 7****Topics are rotated in KS3 but all students will complete in the order shown.*****Note: Year 7 will not follow the currently stated Year 8 curriculum during the academic year 2024-25. This is currently under development and will update here next year.*** | Science is taught under the 3 domains of Biology, Chemistry and Physics. Each of these domains is broken down into 9 ‘Big Ideas’ (BBL, THB, IOL, BOM, OE, CR, BOE, OEOO and BE). Each Big Idea is paired with 1 key aspect ‘Disciplinary Knowledge. Students learn Science skills alongside each Science topic. The Science Disciplinary Knowledge domains are:Thinking Scientifically, Applications and uses of Science, Communicating and Collaborating, Using Investigative Approaches, Working with Evidence and Mathematical SkillsAs an introduction to Key Stage 3 Science, students learn about ‘Mathematical Skills’ and an ‘Introduction to Working in a Science Laboratory’. As part of this introduction in the first few weeks of term, students will learn how to: * Use a scientific calculator to complete the basic functions.
* Construct and interpret bar charts.
* Construct line graphs with given axis.
* Convert in, and out of standard form.
* Provide answers to 2 s.f and express answers in decimal form.
* Find the mean, medium and mode of a data set.
* Calculate percentage of a value.
* Interpret frequency tables, line graphs, bar graph and pie charts.
* Describe patterns and trends in given data.
* Calculate areas of triangles, rectangles, surface area and volume of cubes.
* Solve simple algebraic calculations.
* Understand and use the symbols = < >..
* Use angular measurements.
 |
| **Biology BBL – Building Blocks of Life***This ‘Big Idea’ is primarily paired with the Science Discipline of ‘Applications and uses of Science’.*BBL1 Animal Cells - Topic Content:Animal cell structure, use the light microscope to observe cells in the laboratory, structure of the skeleton, joints and biomechanics and how to dissection chicken wings.BBL2 Human Reproduction – Topic Content:The structure of the male and female reproductive systems, the stages of the menstrual cycle, the sequence of fertilisation to birth and the role of the placenta.**Biology THB – The Human Body***This ‘Big Idea’ is primarily paired with the Science Discipline of ‘Communicating and Collaborating’.*THB7 The Breathing System – Topic Content:The structure of the breathing system, diffusion in breathing, mechanics of breathing and investigating lung capacity.THB8 Healthy Living – Topic Content:Unicellular organisms, recreational drugs, health and the breathing system and health during pregnancy.**Biology IOL – Interaction of Life**No topics taught in this domain during Year 7. | **Chemistry BOM – Behaviour of Matter***This ‘Big Idea’ is primarily paired with the Science Discipline of ‘Working with Evidence’.*BOM5 The Particle Model – Topic Content:The particle model for liquids, solids and gases and the differences between physical and chemical changes.BOM6 The Atom – Topic Content:The difference between atoms, elements and compounds. Representing elements and compounds, what atoms do in chemical reactions? and the conservation of mass.BOM7 Changes of State – Topic Content:Physical changes, measuring volumes, dissolving solutes, concentration of a substance, Brownian motion and diffusion in gases and liquids.BOM8 Purity – Topic Content:Investigating the purity of substances, mixtures, separation by filtration, evaporation techniques and separation by distillation.**Chemistry OE – Our Earth***This ‘Big Idea’ is primarily paired with the Science Discipline of ‘Thinking Scientifically’.*OE3 The Cycles – Topic Content:The Earth’s structure and composition, the rock cycle, the water cycle and the scarcity of drinking water.**Chemistry CR – Chemcial Reactions***This ‘Big Idea’ is primarily paired with the Science Discipline of ‘Applications and uses of Science’.*CR3 Types of Reaction – Topic Content:Different types of chemical reaction including; Combustion, thermal decomposition, oxidation and displacement. | **Physics BOE – Behaviour of Energy**No topics taught in this domain during Year 7.**Physics OEOO – Objects Effects on Other Objects***This ‘Big Idea’ is primarily paired with the Science Discipline of ‘Using Investigative Approaches’.*OEOO4 Changing Shape – Topic Content:Different type of force including whether they are balanced or unbalanced, representing forces through diagrams, graphing forces, and investigating stretching and compressing.**Physics BE – Beyond Earth***This ‘Big Idea’ is primarily paired with the Science Discipline of ‘Working with Evidence’.*BE3 Astrophysics – Topic Content:The structure of the solar system, relative distances in space, stellar bodies, gravity and weight, and why we have seasons.BE4 The Space Race – Topic Content:Satellite's, humans in space, modern and futuristic space exploration, science fiction compared to science fact and investigating whether we are alone in space? |
| **Personal Development** | **Social and Cultural Development (Race For The Line - Rocket Cars)**Appreciate cultural influences; appreciate the role of Britain's parliamentary system; participate in culture opportunities; understand, accept, respect and celebrate diversity. Use a range of social skills; participate in the local community; appreciate diverse viewpoints; participate, volunteer and cooperate; resolve conflict; engage with the 'British values' of democracy, the rule of law, liberty, respect and tolerance.* Building Rocket Cars with Micro Bits. The students will learn about aerodynamics and about how the project and competition can progress into a variety of regional and national heats.
* Students will apply and combine skills in teamwork, working in groups for competition, communication, design, use of tools safely, application of forces and resistance.

**Moral Development**Recognise right and wrong; respect the law; understand consequences; investigate moral and ethical issues; offer reasoned views.**Cultural Development**Appreciate cultural influences; appreciate the role of Britain's parliamentary system; participate in culture opportunities; understand, accept, respect and celebrate diversity. * Development of scientific ideas through the learning of science skills.
* Importance of collaboration in Science.

**Spiritual Development**Reproduction - Focus on people's beliefs around contraception and why people may choose not to use it. Considered from a health point of view as well as religious / belief point of view.  |
|
| **Year 8****Topics are rotated in KS3 but all students will complete in the orders shown.****Students also learn how to ‘*Work Scientifically*’ in the range of topics and a variety of contexts.** | **B2.1 Health and Lifestyle**What forms a healthy diet? How is food broken down in the body? What lifestyle choices can affect a person’s health?Making connections:* In B2 you will learn about how life evolved on Earth.
* In C2 you will learn about the origins of the Earth.
* In P2 you will learn how we use energy in our daily lives.

**OAK Academy Online Learning Link**[Health, Digestion and Lifestyle](https://classroom.thenational.academy/units/infection-and-response-4f71)**B2.2 Ecosystem Processes**How are plants adapted to make their own food? Why do organisms need food to survive? How is energy released from food?Making connections:* In B2 you will learn about how life evolved on Earth.
* In C2 you will learn about the origins of the Earth.
* In P2 you will learn how we use energy in our daily lives.

**OAK Academy Online Learning Link**<https://classroom.thenational.academy/units/ecological-relationships-and-classification-b523>[https://classroom.thenational.academy/units/plants-and-photosynthesis-54c3](https://classroom.thenational.academy/units/cell-biology-b859)**B2.3 Adaptation and Inheritance**Why do organisms change over time? Why don’t we all look the same? What is natural selection?Making connections:* In B2 you will learn about how life evolved on Earth.
* In C2 you will learn about the origins of the Earth.
* In P2 you will learn how we use energy in our daily lives.

**OAK Academy Online Learning Link**[https://classroom.thenational.academy/units/reproduction-and-variation-f60f](https://classroom.thenational.academy/units/electricity-f083) | **C2.1 The Periodic Table**How does the periodic table help us predict the properties of elements? What are the patterns in the properties of metals?Making connections:* In B2 you will learn about nutrition and lifestyle.
* In C2 you will learn how we obtain materials and the patterns in elements and their properties.
* In P2 you will learn how we use energy and power.

**OAK Academy Online Learning Link**[Atoms and The Periodic Table](https://classroom.thenational.academy/units/cell-biology-b859)**C2.2 Separation Techniques**How do we obtain the materials we use? Why are different methods needed to separate mixtures?Making connections:* In B2 you will learn about nutrition and lifestyle.
* In C2 you will learn how we obtain materials and the patterns in elements and their properties.
* In P2 you will learn how we use energy and power.

**C2.3 Metals and Acids**How do we obtain the materials we use? What are the patterns in the properties of elements? Why do different materials have different properties?Making connections:* In B2 you will learn about nutrition and lifestyle.
* In C2 you will learn how we obtain materials and the patterns in elements and their properties.
* In P2 you will learn how we use energy and power.

**OAK Academy Online Learning Link**[https://classroom.thenational.academy/units/energetics-and-rates-067a](https://classroom.thenational.academy/units/homeostasis-and-response-1a15)**C2.4 The Earth**How do we obtain the materials we use? How are rocks formed? How are rocks and carbon naturally recycled?Making connections:* In B2 you will learn about nutrition and lifestyle.
* In C2 you will learn how we obtain materials and the patterns in elements and their properties.
* In P2 you will learn how we use energy and power.

**OAK Academy Online Learning Link**<https://classroom.thenational.academy/units/materials-and-the-earth-78e8> | **P2.1 Electricity and Magnetism**What happens in an electric circuit? How can circuits be connected? How are electromagnets made?Making connections:* In P2 you will learn about energy and motion.
* In C1 you will learn about the Earth and the properties of elements.
* In B2 you will learn about energy in food chains.

**OAK Academy Online Learning Link**[Electricity and Magnetism](https://classroom.thenational.academy/units/bonding-structure-and-the-properties-of-matter-e93f)**P2.2 Energy**What happens in a power station? How is energy transferred? What is the difference between work and energy?Making connections:* In P2 you will learn about energy and motion.
* In C1 you will learn about the Earth and the properties of elements.
* In B2 you will learn about energy in food chains.

**P2.3 Motion and Pressure**Why are aircraft cabins pressurised? How is speed calculated? Why is pressure different in different materials? What is a moment?Making connections:* In P2 you will learn about energy and motion.
* In C1 you will learn about the Earth and the properties of elements.
* In B2 you will learn about energy in food chains.

**OAK Academy Online Learning Link**[https://classroom.thenational.academy/units/forces-and-motion-b426](https://classroom.thenational.academy/units/cells-tissues-and-organs-03b2) |
| **Personal Development** | **Social Development**Use a range of social skills; participate in the local community; appreciate diverse viewpoints; participate, volunteer and cooperate; resolve conflict; engage with the 'British values' of democracy, the rule of law, liberty, respect and tolerance. * Ormiston STEM Competition - Students complete a themed research project in small groups. Students have to work together to produce a presentation about an aspect of science where a solution is being given to a problem. The presentation can involve slides and/or video.

**Moral Development**Recognise right and wrong; respect the law; understand consequences; investigate moral and ethical issues; offer reasoned views.* Diet and exercise and consequences of this not being balanced is looked at in depth.
* How a poor diet can lead to diet deficiency disease.

**Cultural Development**Appreciate cultural influences; appreciate the role of Britain's parliamentary system; participate in culture opportunities; understand, accept, respect and celebrate diversity. * Development of scientific ideas through the learning of science skills.
* Importance of collaboration in Science.
 |
| **Year 9****Topics are rotated in KS3 but all students will complete in the orders shown.****Students also learn how to:****‘*Work Scientifically*’ in the range of topics and a variety of contexts.****Apply mathematical and practical skills to a range of science contexts, including using data, interpreting data, planning investigations and evaluating practical skills and safety.** | **Working Scientifically**How do scientists develop ideas into questions? How do you write a plan for an investigation and consider precision and accuracy? How should data be collected and recorded? How can data be presented and analysed? How do scientists evaluate investigations and data collected to make improvements to any investigation or study? How do scientists use mathematical and statistical skills to make judgements about the outcome they discover in science investigations and studies. The concepts for working scientifically are then embedded across all years in a variety of contexts.**Making connections:**Working Scientifically is the very foundation of ‘How Science Works’. The concepts learned here will be embedded across every single topic in KS4. From Year 9 onwards, students will also begin to practice and apply higher levels of numeracy that will cross over from Maths and that are transferable to many other subjects too. |
| **B1 Cells**What are the differences between plant, animal and microbial cells? How are cells highly specialised? How do substances move in and out of cells?Making connections:* Eukaryotic and prokaryotic cells have evolved over time and are classified in B15.

**OAK Academy Online Learning Link**[https://classroom.thenational.academy/units/cell-biology-b859](https://classroom.thenational.academy/units/energy-changes-b607)**B2 Cell Division**How do cells grow and divide and what medical problems can this lead to?Making connections:* Cell division in reproductive cells is covered in B13. Comparisons are made between mitosis and meiosis.

**OAK Academy Online Learning Link**[https://classroom.thenational.academy/units/cell-biology-b859](https://classroom.thenational.academy/units/inheritance-variation-and-evolution-0224)**B3 Organisation and the Digestive System**What factors affect how an enzyme works?Making connections:* Rates of reaction in chemistry C8 covers the catalysis of all chemical reactions.

**OAK Academy Online Learning Link**[https://classroom.thenational.academy/units/organisation-2345](https://classroom.thenational.academy/units/forces-6562)**B4 Organising Plants and Animals**How can stents prevent a heart attack?Making connections:* Lifestyle factors such as smoking, alcohol and exercise levels affect the health of your heart, lungs and organs as covered in B7.

**OAK Academy Online Learning Link**[https://classroom.thenational.academy/units/organisation-2345](https://classroom.thenational.academy/units/homeostasis-and-response-1a15) | **C1 Atomic Structure**How do atoms differ from one another?Making connections:* Periodic table data and patterns of reactivity in C2 and C5.
* Chemical calculations and use of periodic table data throughout the whole of Chemistry.

**OAK Academy Online Learning Link**[https://classroom.thenational.academy/units/atomic-structure-and-periodic-table-c831](https://classroom.thenational.academy/units/reproduction-and-variation-f60f)**C2 The Periodic Table**Why was the periodic table such an important scientific breakthrough?Making connections:* Atomic structure and reactivity series.
* Allows students to use patterns in structure and bonding.

**OAK Academy Online Learning Link**[https://classroom.thenational.academy/units/atomic-structure-and-periodic-table-c831](https://classroom.thenational.academy/units/infection-and-response-4f71)**C3 Structure and Bonding (Potential Separate Science Groups Only)**How do different atoms bond together and how does this affect their properties and uses for everyday materials?Making connections:* Chemical calculations.
* Redox reactions including electrolysis.
* Uses of all materials based on their structure and properties.
* Structure of organic compounds.
* Testing for ions.

**OAK Academy Online Learning Link**[https://classroom.thenational.academy/units/bonding-structure-and-the-properties-of-matter-e93f](https://classroom.thenational.academy/units/bioenergetics-244e) | **P1 Energy Conservation and Dissipation**How is energy stored and transferred?Making connections:* Energy transfers from one store to another in P2.
* How energy needs to be conserved in P3.

**OAK Academy Online Learning Link**[https://classroom.thenational.academy/units/energy-c750](https://classroom.thenational.academy/units/digestion-and-nutrition-9fd9)**P2 Energy Transfer**How is energy transferred from one form to another? How can we calculate the energy needed to heat an object? What is meant by thermal conductivity?Making connections:* Energy generated in power stations is provided by the flick of a switch and via circuits in P4.. Energy reaches us via national grid making links to P4, P5 and P15.

**OAK Academy Online Learning Link**[https://classroom.thenational.academy/units/energy-c750](https://classroom.thenational.academy/units/waves-4cef)**P3 Energy Resources** How can we compare different energy sources?Making connections:* Nuclear power stations provide us with energy without burning fossils fuels. Nuclear power generation generates large amounts of electricity. Nuclear reactions are covered in P7.

**OAK Academy Online Learning Link**[https://classroom.thenational.academy/units/energy-c750](https://classroom.thenational.academy/units/forces-6562) |
| **Year 10****There are no topic rotations and the order is followed as shown.****Students also learn how to:****‘*Work Scientifically*’ in a range of topics and a variety of contexts.****Apply mathematical and practical skills to a range of science contexts, including using data, interpreting data, planning investigations and evaluating practical skills and safety.** | **B5 Communicable Disease**What are communicable diseases and how can we prevent them?Making connections:* Genetic diseases, which are not infectious but can be passed parent to offspring in B13.

**OAK Academy Online Learning Link**[https://classroom.thenational.academy/units/infection-and-response-4f71](https://classroom.thenational.academy/units/inheritance-variation-and-evolution-0224)**B6 Preventing and Treating Disease**What are the most effective ways of treating infectious disease?Making connections:* Lifestyle factors such as diet, exercise, smoking and hygiene.

**OAK Academy Online Learning Link**[https://classroom.thenational.academy/units/infection-and-response-4f71](https://classroom.thenational.academy/units/particle-model-of-matter-a6d5)**B7 Non-Communicable Disease**How can your lifestyle affect your risk of developing many non-communicable diseases, such as Type II Diabetes?Making connections:* Prevention of disease B6.
* Healthy lifestyle in KS3.

**OAK Academy Online Learning Link**[https://classroom.thenational.academy/units/infection-and-response-4f71](https://classroom.thenational.academy/units/energetics-and-rates-067a)**B8 Photosynthesis**How do plants use glucose they make during photosynthesis?Making connections:* Plant transport and the cross section of the leat in specialised cells B1.

**OAK Academy Online Learning Link**<https://classroom.thenational.academy/units/bioenergetics-244e>**B9 Respiration**What is the difference between aerobic and anaerobic respiration?Making connections:* Pollution of a waterway by fertilisers or sewage can make it impossible for plants and animals to respire in B16-B17.

**OAK Academy Online Learning Link**[https://classroom.thenational.academy/units/bioenergetics-244e](https://classroom.thenational.academy/units/atoms-and-the-periodic-table-68d3)**B10 The Nervous System**What are reflexes and how do they aid survival? How does our body detect and respond to changes around us in our environment?Making connections:* The structure of specialised cells in B1.
* Chemicals properties of lipids in B3.

**OAK Academy Online Learning Link**[https://classroom.thenational.academy/units/homeostasis-and-response-1a15](https://classroom.thenational.academy/units/reproduction-and-variation-f60f)**B11 Hormonal Coordination**How do hormones control responses such as the way plants bend towards light, and the release of a mature egg in the human menstrual cycle?Making connections:* Development and differentiation of specialised cells in B1.

**OAK Academy Online Learning Link**[https://classroom.thenational.academy/units/homeostasis-and-response-1a15](https://classroom.thenational.academy/units/biological-systems-and-processes-bf5a)**B12 Homeostasis**Why is homeostasis important for survival? What is the process involved in temperature control in animals?Making connections:* The importance of heart and breathing control in exercise B4.
* Adaptations of organisms to maintain homeostasis in challenging environmental conditions B16.

**OAK Academy Online Learning Link**[https://classroom.thenational.academy/units/homeostasis-and-response-1a15](https://classroom.thenational.academy/units/chemical-reactions-5ffa) | **C3 Structure and Bonding (Combined Science Groups Only)**How do different atoms bond together and how does this affect their properties and uses for everyday materials?Making connections:* Chemical calculations.
* Redox reactions including electrolysis.
* Uses of all materials based on their structure and properties.
* Structure of organic compounds.
* Testing for ions.

**C4 Chemical Calculations**How do we use chemical equations to predict reacting quantities?Making connections:* C1 Atomic structure and a variety of calculations used later in the course.

**OAK Academy Online Learning Link**<https://classroom.thenational.academy/units/quantitative-chemistry-4db7>**C5 Chemical Changes**How can we extract metals from their ores? How can we make and prepare pure, dry samples of salts?Making connections:* Displacement reactions and the use of electrolysis will be applied in C14.

**OAK Academy Online Learning Link**[https://classroom.thenational.academy/units/chemical-changes-a5ba](https://classroom.thenational.academy/units/forces-6562)**C6 Electrolysis**How can we decompose ionic compounds to get useful products?Making connections:* Displacement reactions and the use of electrolysis will be applied in C14.
* Redox reactions already learned in C5.

[https://classroom.thenational.academy/units/chemical-changes-a5ba](https://classroom.thenational.academy/units/inheritance-variation-and-evolution-0224)**C7 Energy Changes**Why do chemical reactions always involve transfer of energy?Making connections:* Reaction profile diagrams will be used to explain the effect of catalyst of reaction rates in C8.
* Bond energy calculations relies on students drawing 2D structures from C3.

**OAK Academy Online Learning Link**[https://classroom.thenational.academy/units/energy-changes-b607](https://classroom.thenational.academy/units/reactivity-609c)**C8 Rates and Equilibrium**How are reaction rates and reversible reactions affected by changing conditions?Making connections:* Big emphasis on ‘Working scientifically’ from any previous topic.
* Chemical changes between reactants in C5.

**OAK Academy Online Learning Link**[https://classroom.thenational.academy/units/the-rate-and-extent-of-chemical-change-0530](https://classroom.thenational.academy/units/atomic-structure-d811)**C9 Crude Oil and Fuels**How is a range of useful products obtained from crude oil?Making connections:* Pollutants from combustion of fuels have been examined in C13.
* The structure of hydrocarbons and related organic compounds to in C10.

**OAK Academy Online Learning Link**[https://classroom.thenational.academy/units/organic-chemistry-7c58](https://classroom.thenational.academy/units/waves-4cef) | **P4 Electric Circuits**What is electric current? How do series and parallel circuits differ?Making connections:* How electricity generators work in P15.

**OAK Academy Online Learning Link**[https://classroom.thenational.academy/units/electricity-f083](https://classroom.thenational.academy/units/organisation-2345)**P5 Electricity in the Home**How is electricity made and how energy is used in our homes. How can energy be saved in the home? How is electrical energy used calculated? Making connections:* Use of some equations used in P1.
* Calculating energy supplied to a device in P1.
* Calculating efficiency and power in P1.

**OAK Academy Online Learning Link**[https://classroom.thenational.academy/units/electricity-f083](https://classroom.thenational.academy/units/waves-4cef)**P6 Molecules and Matter**What do we mean by density and elasticity?Making connections:.* Particles models and changes of state in C3 Chemistry.
* Density of water in P11.
* Atmospheric pressure in P11.
* Specific heat capacity in P2.

**OAK Academy Online Learning Link**[https://classroom.thenational.academy/units/particle-model-of-matter-a6d5](https://classroom.thenational.academy/units/light-and-space-fa61)**P7 Radioactivity**What is the half-life of a radioactive isotope?Making connections:* Chemistry C1 atomic structure to understand concept of isotopes.
* Applications of x-rays in P13.
* Medical image systems and ultrasounding in P12.

[https://classroom.thenational.academy/units/atomic-structure-d811](https://classroom.thenational.academy/units/ecology-a6da)**P8 Forces in Balance**How do we present a force and what is meant by a resultant force? How do we work out resultant forces?Making connections:* Newton’s Second Law in P10.
* Calculating forces at KS3.
* Investigating and measuring forces with motion and pressure.

**OAK Academy Online Learning Link**[https://classroom.thenational.academy/units/forces-6562](https://classroom.thenational.academy/units/chemical-changes-a5ba)**P9 Motion**What is momentum?Making connections:* Rearranging equations (H tier only).
* Velocity and displacement as vector quantities.
* Speed is a scalar quantity.

**OAK Academy Online Learning Link**[https://classroom.thenational.academy/units/forces-6562](https://classroom.thenational.academy/units/organic-chemistry-7c58)**P10 Force and Motion**What is meant by elasticity? How do different materials stretch?Making connections:* Calculating acceleration in P9.
* Friction has been learned in P8.
* Momentum is a vector quantity in P8.
* Maths skills for inverse proportion.

**OAK Academy Online Learning Link**[https://classroom.thenational.academy/units/forces-6562](https://classroom.thenational.academy/units/energy-c750) |
| **Personal Development** | **Social Development.**Use a range of social skills; participate in the local community; appreciate diverse viewpoints; participate, volunteer and cooperate; resolve conflict; engage with the 'British values' of democracy, the rule of law, liberty, respect and tolerance. * Students go to Thorpe park to learn about the fun of forces. Students have to work in groups to complete a trail around the theme park following some presentations and lectures about forces in the context of the thrill rides.

**Moral Development**Recognise right and wrong; respect the law; understand consequences; investigate moral and ethical issues; offer reasoned views.* Students study the importance of fossil fuels to human society and the impact their usage is having.

**Cultural Development**Appreciate cultural influences; appreciate the role of Britain's parliamentary system; participate in culture opportunities; understand, accept, respect and celebrate diversity. * Development of scientific ideas through the learning of science skills.
* Importance of collaboration in Science.

**Spiritual Development**Explore beliefs and experience; respect faiths, feelings and values; enjoy learning about oneself, others and the surrounding world; use imagination and creativity; be reflective. * MMR Vaccines - Look at how people's beliefs can be influenced by others and how science is needed to sometimes demonstrate fact over people's opinions.
 |
| **Year 11****There are no topic rotations and the order is followed as shown.****Students also learn how to:****‘*Work Scientifically*’ in the range of topics and a variety of contexts.****Apply mathematical and practical skills to a range of science contexts, including using data, interpreting data, planning investigations and evaluating practical skills and safety.** | **B13 Reproduction**How do plants and animals reproduce? What is DNA? What is a genome?Making connections:* Meristem cells in plants are involved in tropic responses.

**OAK Academy Online Learning Link**[https://classroom.thenational.academy/units/inheritance-variation-and-evolution-0224](https://classroom.thenational.academy/units/homeostasis-and-response-1a15)**B14 Variation and Evolution**How are characteristics passed from parents to offspring? What are the benefits of genetic engineering?Making connections:* The causes of natural selection in B15.

**OAK Academy Online Learning Link**[https://classroom.thenational.academy/units/inheritance-variation-and-evolution-0224](https://classroom.thenational.academy/units/atoms-and-the-periodic-table-68d3)**B15 Genetics and Evolution**How does evolution by natural selection take place and why are mutations important?Making connections:* How sexual reproduction causes genetic variation learned in B13.

**OAK Academy Online Learning Link**[https://classroom.thenational.academy/units/inheritance-variation-and-evolution-0224](https://classroom.thenational.academy/units/energy-0b08)**B16 Adaptations**What adaptations do animals and plants have that enables them to survive and in some cases in extreme conditions?Making connections:* Living organisms have adaptations to survive certain ecosystem conditions and the impact from human activity in B17-18.

**OAK Academy Online Learning Link**<https://classroom.thenational.academy/units/ecology-a6da>**B17 Ecosystems**How do living and nonliving components in ecosystems interact and what affect can humans have on ecosystems?Making connections:* The effects of human activity on ecosystems is covered in Geography.
* Backlinks to living things and their adaptations to survive abiotic and biotic components in ecosystems.

**OAK Academy Online Learning Link**[https://classroom.thenational.academy/units/ecology-a6da](https://classroom.thenational.academy/units/chemical-changes-a5ba)**B18 Biodiversity**What is the range of living species around the world and in different ecosystems?Making connections:* The effects of population dynamics on the world's resources and biodiversity will link into Geography.

[https://classroom.thenational.academy/units/ecology-a6da](https://classroom.thenational.academy/units/forces-in-action-543b) | **C10 Organic Reactions (Separate Science Only)**How do the functional groups affect the reactions of organic compounds?Making connections:* Understanding of the basic structure of organic compounds and hydrocarbons from C9.
* Fermentation is revisited here as well in respiration and Biology.

**OAK Academy Online Learning Link**[https://classroom.thenational.academy/units/organic-chemistry-7c58](https://classroom.thenational.academy/units/using-resources-febe)**C11 Polymers (Separate Science Only)**How does the structure of a polymer affect its properties?Making connections:* The ethics of waste disposal in Geography and PHSE/MSC.

**OAK Academy Online Learning Link**[https://classroom.thenational.academy/lessons/natural-and-addition-polymers-c8t3et](https://classroom.thenational.academy/units/the-rate-and-extent-of-chemical-change-0530)**C12 Chemical Analysis**How can we use chemical tests to identify unknown substances?Making connections:* Analysis of chromatograms and carrying out chromatography in C1.

**OAK Academy Online Learning Link**<https://classroom.thenational.academy/units/chemical-analysis-cf8d>**C13 Earth and the Atmosphere**How is human activity affecting the Earth’s atmosphere?Making connections:* Atmospheric pollution and trends may be covered in Geography and in particular the impact of human activity.

[https://classroom.thenational.academy/units/chemistry-of-the-atmosphere-522e](https://classroom.thenational.academy/units/space-physics-only-a558)**C14 The Earth’s Resources**How are we seeking to make sustainable use of the Earth’s limited resources?Making connections:* How population dynamics affect the demands on Earth's resources in Geography.

**OAK Academy Online Learning Link**[https://classroom.thenational.academy/units/using-resources-febe](https://classroom.thenational.academy/units/forces-6562)**C15 Using Our Resources**How are we seeking to make sustainable use of the Earth’s limited resources?Making connections:* Understanding of polymers allows us to understand materials choices and demands.

**OAK Academy Online Learning Link**[https://classroom.thenational.academy/units/using-resources-febe](https://classroom.thenational.academy/units/atomic-structure-and-periodic-table-c831) | **P11 Forces and Pressure**How do we measure forces and pressure?Making connections:* Backlinks to P1 energy transfer.

[https://classroom.thenational.academy/units/forces-6562](https://classroom.thenational.academy/units/electricity-and-magnetism-ab64)**P12 Wave Properties**How do we measure waves and how fast do they travel? What happens when waves meet boundaries between two different substances?Making connections:* Wavelength depends on speed and frequency.
* Measuring speed in P8.
* Uses of oscilloscopes covered in P5.

**OAK Academy Online Learning Link**[https://classroom.thenational.academy/units/waves-4cef](https://classroom.thenational.academy/units/forces-and-motion-b426)**P13 Electromagnetic Waves**What are electromagnetic waves and how do they differ from sound waves? Making connections:* Previous knowledge of sound at KS3.
* Energy transfer backlink to P1-3.
* Infrared radiation covered in P2.
* Alternating currents covered in P5.
* Radioactive isotopes in P7.

**OAK Academy Online Learning Link**[https://classroom.thenational.academy/units/waves-4cef](https://classroom.thenational.academy/units/infection-and-response-4f71)**P14 Light**How do waves carry information and how they can form images?Making connections:* Astronomers use non-optical telescopes to obtain images of objects in space P16.

**OAK Academy Online Learning Link**[https://classroom.thenational.academy/units/waves-4cef](https://classroom.thenational.academy/units/chemical-reactions-5ffa)**P15 Electromagnetism**How is the strength of an electromagnetic field measured and what a solenoid is?Making connections:* Power stations generate alternating currents not direct currents. Alternating currents and transformers will link back to P5.

**OAK Academy Online Learning Link**[https://classroom.thenational.academy/units/magnetism-bf8d](https://classroom.thenational.academy/units/particles-f50c)**P16 Space**How do satellites orbit the Earth and what are geostationary satellites?Making connections:* Heavier elements and half-life in P7.

**OAK Academy Online Learning Link**[https://classroom.thenational.academy/units/space-physics-only-a558](https://classroom.thenational.academy/units/light-and-space-fa61) |
| **Personal Development** | **Social Development.**Use a range of social skills; participate in the local community; appreciate diverse viewpoints; participate, volunteer and cooperate; resolve conflict; engage with the 'British values' of democracy, the rule of law, liberty, respect and tolerance. * Students go to Thorpe park to learn about the fun of forces. Students have to work in groups to complete a trail around the theme park following some presentations and lectures about forces in the context of the thrill rides.
* Any students who missed this trip in Year 10 due to limitations or availability have a second opportunity in Year 11.

**Moral Development**Recognise right and wrong; respect the law; understand consequences; investigate moral and ethical issues; offer reasoned views.* Students consider the impact of multiple chemical and industrial processes on the environment - including the combustion of hydrocarbons and the impacts of global warming and acid rain on the environment. The production of ammonia during the Haber process and usage of excessive fertilisers on food chains are considered in detail.
* Teenage pregnancy and the consequences of this and underage sex is looked at and discussed.

**Cultural Development**Appreciate cultural influences; appreciate the role of Britain's parliamentary system; participate in culture opportunities; understand, accept, respect and celebrate diversity. * Development of scientific ideas through the learning of science skills.
* Speciation and evolution.
* The Big Bang theory.
* Climate Change and Earth’s Atmosphere.
* Importance of collaboration in Science.

**Spiritual Development**Explore beliefs and experience; respect faiths, feelings and values; enjoy learning about oneself, others and the surrounding world; use imagination and creativity; be reflective. * IVF and fertility treatment - Focus on the ethics behind IVF and use informed decisions on people's life situations to decide / debate which couples should be given the limited availability of IVF.
* Genetic Engineering and cloning - Use understanding of cloning techniques to evaluate whether embryo cloning should be allowed and to what level. Often carried out in debate form although some groups will complete extra research around the topic
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