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| **YEAR** | **Biology** | **Chemistry** | **Physics** |
| **7** | Science is taught under the 3 domains of Biology, Chemistry and Physics. This is known as ‘Substantive Knowledge’ **(Sub)**. 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’ **(Dis)**. Students learn additional ‘Science disciplinary 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 Skills. | | |
| **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:  (Dis) Constructing bar charts and histograms.  (Sub) 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.  [National Academy - Cells](https://www.thenational.academy/pupils/programmes/science-secondary-year-7/units/cells/lessons)  [National Academy - Human skeleton and muscles](https://www.thenational.academy/pupils/programmes/science-secondary-year-7/units/human-skeleton-and-muscles/lessons)  BBL2 Human Reproduction – Topic Content:  (Dis) Describe patterns in trends of data.  (Sub) 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.  [National Academy - Reproduction](https://www.thenational.academy/pupils/programmes/science-secondary-year-8/units/reproduction-in-humans/lessons)  **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:  (Dis) Describe patterns in trends of data.  (Sub) The structure of the breathing system, diffusion in breathing, mechanics of breathing and investigating lung capacity.  [National Academy - Breathing and respiration](https://www.thenational.academy/pupils/programmes/science-secondary-year-8/units/breathing-and-respiration/lessons)  THB8 Healthy Living – Topic Content:  (Dis) Calculating averages and percentages.  (Sub) Unicellular organisms, recreational drugs, health and the breathing system and health during pregnancy.  [National Academy - Diet and exercise](https://www.thenational.academy/pupils/programmes/science-secondary-year-8/units/diet-and-exercise/lessons)  **Biology IOL – Interaction of Life**  *This ‘Big Idea’ is primarily paired with the Science Discipline of ‘Using investigative approaches.*  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:  (Dis) Introduction to working in a science laboratory, including risk assessments.  (Sub) The particle model for liquids, solids and gases and the differences between physical and chemical changes.  [National Academy - States of matter](https://www.thenational.academy/pupils/programmes/science-secondary-year-7/units/solid-liquid-gas-states-and-changes-of-state/lessons)  BOM6 The Atom – Topic Content:  (Dis) Convert in and out of standard form.  (Sub) The difference between atoms, elements and compounds. Representing elements and compounds, what atoms do in chemical reactions? and the conservation of mass.  [National Academy - Atoms, elements and compounds](https://www.thenational.academy/pupils/programmes/science-secondary-year-7/units/atoms-elements-and-compounds/lessons)  BOM7 Changes of State – Topic Content:  (Dis) Calculating areas of shapes and surface area.  (Sub) Physical changes, measuring volumes, dissolving solutes, concentration of a substance, Brownian motion and diffusion in gases and liquids.  [National Academy - States of matter](https://www.thenational.academy/pupils/programmes/science-secondary-year-7/units/solid-liquid-gas-states-and-changes-of-state/lessons)  BOM8 Purity – Topic Content:  (Dis) Constructing frequency tables.  (Sub) Investigating the purity of substances, mixtures, separation by filtration, evaporation techniques and separation by distillation.  [National Academy - Solutions](https://www.thenational.academy/pupils/programmes/science-secondary-year-7/units/solutions/lessons)  [National Academy - Separation techniques](https://www.thenational.academy/pupils/programmes/science-secondary-year-7/units/separation-techniques/lessons)  **Chemistry OE – Our Earth**  *This ‘Big Idea’ is primarily paired with the Science Discipline of ‘Thinking Scientifically’.*  OE3 The Cycles – Topic Content:  (Dis) Constructing pie charts.  (Sub) The Earth’s structure and composition, the rock cycle, the water cycle and the scarcity of drinking water.  [National Academy - Cycles](https://www.thenational.academy/pupils/programmes/science-secondary-year-9/units/carbon-cycle-and-climate-change/lessons)  **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:  (Dis) Making observations and drawing conclusions.  (Sub) Different types of chemical reaction including; Combustion, thermal decomposition, oxidation and displacement.  [National Academy - Chemical reactions](https://www.thenational.academy/pupils/programmes/science-secondary-year-8/units/understanding-chemical-reactions/lessons) | **Physics BOE – Behaviour of Energy**  *This ‘Big Idea’ is primarily paired with the Science Discipline of ‘communicating and collaborating’.*  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:  (Dis) Constructing line graphs.  (Sub) Different type of force including whether they are balanced or unbalanced, representing forces through diagrams, graphing forces, and investigating stretching and compressing.  [National Academy - Forces](https://www.thenational.academy/pupils/programmes/science-secondary-year-7/units/forces/lessons)  **Physics BE – Beyond Earth**  *This ‘Big Idea’ is primarily paired with the Science Discipline of ‘Working with Evidence’.*  BE3 Astrophysics – Topic Content:  (Dis) Using a scientific calculator in science. Analysing patterns and trends in data.  (Sub) The structure of the solar system, relative distances in space, stellar bodies, gravity and weight, and why we have seasons.  [National Academy - Solar system](https://www.thenational.academy/pupils/programmes/science-secondary-year-7/units/solar-system-and-beyond/lessons)  BE4 The Space Race – Topic Content:  (Dis) Exploring the history of science evidence and ideas.  (Sub) Satellite's, humans in space, modern and futuristic space exploration, science fiction compared to science fact and investigating whether we are alone in space?  [National Academy - Solar system](https://www.thenational.academy/pupils/programmes/science-secondary-year-7/units/solar-system-and-beyond/lessons) |
| **8** | **Biology THB – The Human Body**  *This ‘Big Idea’ is primarily paired with the Science Discipline of ‘Communicating and Collaborating’.*  THB9 The Digestive System – Topic Content:  (Dis) Working with others, sampling techniques and drawing conclusions.  (Sub) Healthy diet, calculating daily energy requirements, diet deficiency disease, tissue and organ adaptations to function, how enzymes help in digestion, the importance of bacteria in digestion.  [National Academy - Human Digestion](https://www.thenational.academy/pupils/programmes/science-secondary-year-7/units/human-digestive-system/lessons)  **Biology BBL – Building Blocks of Life**  *This ‘Big Idea’ is primarily paired with the Science Discipline of ‘Applications and uses of Science’.*  [National Academy - Cells](https://www.thenational.academy/pupils/programmes/science-secondary-year-7/units/cells/lessons)  BBL3 Cellular Respiration – Topic Content:  (Dis) Using scientific language and ideas.  (Sub) Organ systems – the respiratory system, cellular respiration, aerobic respiration, anaerobic respiration and why living organisms respire.  [National Academy - Breathing and respiration](https://www.thenational.academy/pupils/programmes/science-secondary-year-8/units/breathing-and-respiration/lessons)  BBL4 Plant Cells – Topic Content:  (Dis) Science ideas and language. Collecting and handling data.  (Sub) Plant cell structure, using microscopes, flower dissection, pollination, seeds and seed dispersal.  [National Academy - Plant reproduction](https://www.thenational.academy/pupils/programmes/science-secondary-year-9/units/reproduction-in-plants/lessons)  **Biology IOL – Interactions of Life**  *This ‘Big Idea’ is primarily paired with the Science Discipline of ‘Using investigative approaches.*  IOL12 Photosynthesis – Topic Content:  (Dis) Handling anomalies, repeats and uncertainty in data.  (Sub) Photosynthesis reactions, reactants of photosynthesis, investigating carbon dioxide in photosynthesis, investigating the products of photosynthesis, investigating light and photosynthesis.  [National Academy - Photosynthesis](https://www.thenational.academy/pupils/programmes/science-secondary-year-9/units/plant-nutrition-and-photosynthesis/lessons) | **Chemistry CR – Chemcial Reactions**  *This ‘Big Idea’ is primarily paired with the Science Discipline of ‘Applications and uses of Science’.*  CR4 The pH Scale – Topic Content:  (Dis) Constructing line graphs from sets of data.  (Sub) Identifying acids and alkalis, interpret the pH scale, neutralisation reactions, planning investigations, energy exchanges in reactions and changes of state in reactions.  [National Academy - Acids and bases](https://www.thenational.academy/pupils/programmes/science-secondary-year-8/units/acids-and-bases/lessons)  **Chemistry OE – Our Earth**  *This ‘Big Idea’ is primarily paired with the Science Discipline of ‘Thinking Scientifically’.*  OE4 Our Atmosphere – Topic Content:  (Dis) Analysing data and life cycle assessments.  (Sub) Structure and composition of Earth’s atmosphere, the carbon cycle, global warming, climate change and using Earth’s resources.  [National Academy - Using Earth's resources](https://www.thenational.academy/pupils/programmes/science-secondary-year-8/units/earths-resources/lessons) | **Physics BOE - Behaviour of Energy**  *This ‘Big Idea’ is primarily paired with the Science Discipline of ‘communicating and collaborating’.*  BOE10 Principles of Energy – Topic Content:  (Dis) Scientific language and ideas.  (Sub) Energy stores and their changes, conservation of energy, energy pathways, unwanted and wasted energy.  [National Academy - Energy](https://www.thenational.academy/pupils/programmes/science-secondary-year-9-l/units/energy-2ga1p6y/lessons)  BOE11 Heating and Cooling – Topic Content:  (Dis) Using abstract models, handling data including calculating averages.  (Sub) Temperature, energy in food, conduction, convection and thermal equilibrium.  [National Academy - Fuel and energetics](https://www.thenational.academy/pupils/programmes/science-secondary-year-8/units/fuels-and-energetics/lessons)  BOE12 Energy in the Home – Topic Content:  (Dis) New evidence and theories in science.  (Sub) Non-renewable and renewable resources, electrical appliances, transferring energy and paying for energy.  [National Academy - Using Earth's resources](https://www.thenational.academy/pupils/programmes/science-secondary-year-8/units/earths-resources/lessons)  BOE13 Waves – Topic Content:  (Dis) Identifying the strengths and weaknesses of models, development of science ideas and technology and making conclusions from data.  (Sub) General waves, soundwaves, detecting sound, hearing and ultrasound.  [National Academy - Sound and light waves](https://www.thenational.academy/pupils/programmes/science-secondary-year-7/units/sound-light-and-vision/lessons)  [National Academy - Waves](https://www.thenational.academy/pupils/programmes/science-secondary-year-9/units/waves/lessons)  **Physics OEOO - Objects Effects on other Objects**  *This ‘Big Idea’ is primarily paired with the Science Discipline of ‘Using investigative approaches.*  OEOO5 Electrical Circuits – Topic Content:  (Dis) Following procedures and categorising data (qualitative and quantitative).  (Sub) Circuit diagrams, building circuits, series and parallel circuits, measuring potential difference, measuring resistance and learning the relationships between variables in a circuit.  [National Academy - Series circuits](https://www.thenational.academy/pupils/programmes/science-secondary-year-8/units/series-circuits/lessons)  [National Academy - Resistance and parallel circuits](https://www.thenational.academy/pupils/programmes/science-secondary-year-9/units/resistance-and-parallel-circuits/lessons)  OEOO6 Forces and Motion – Topic Content:  (Dis) Science data and road safety, discrete and continuous data and presenting data in charts.  (Sub) Distance time graphs, measuring and determining speed, changing the subject of a formula, relative motion and changing speed.  [National Academy - Forces and motion](https://www.thenational.academy/pupils/programmes/science-secondary-year-8/units/moving-by-force/lessons)  OEOO7 Changing Forces – Topic Content:  (Dis) Communication using scientific and mathematical language, constructing line graphs and frequency tables and scientific collaboration in ideas and evidence.  (Sub) Resultant forces, deformation, Hooke’s Law, work done, turning forces and moments.  [National Academy - Forces](https://www.thenational.academy/pupils/programmes/science-secondary-year-9/units/hidden-forces/lessons) |
| **9** | **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) |
| **10** | **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) |
| **11** | **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) |