

Year 7 Science Curriculum: Biology			
	Autumn	Spring	Summer
Topic:	Biology: Organisms – Movement and Cells	Biology: Ecosystems –Interdependence and plant reproduction	Biology: Genes – Variation and human reproduction
Knowledge covered:	The parts of the human skeleton work as a system for support, protection, movement and the production of new blood cells. Antagonistic pairs of muscles create movement when one contracts and the other relaxes Multicellular organisms are composed of cells which are organised into tissues, organs and systems to carry out life processes. There are many types of cell. Each has a different structure or feature so it can do a specific job.	Organisms in a food web (decomposers, producers and consumers) depend on each other for nutrients. So, a change in one population leads to changes in others. The population of a species is affected by the number of its predators and prey, disease, pollution and competition between individuals for limited resources such as water and nutrients. Plants have adaptations to disperse seeds using wind, water or animals. Plants reproduce sexually to produce seeds, which are formed following fertilisation in the ovary	There is variation between individuals of the same species. Some variation is inherited, some is caused by the environment and some is a combination. Variation between individuals is important for the survival of a species, helping it to avoid extinction in an always changing environment. The menstrual cycle prepares the female for pregnancy and stops if the egg is fertilised by a sperm. The developing foetus relies on the mother to provide it with oxygen and nutrients, to remove waste and protect it against harmful substances.
Online resources:	Oak Academy online resources: https://classroom.thenational.academy/subjectsby-year/year-7/subjects/science https://classroom.thenational.academy/subjectsby-year/year-8/subjects/science BBC bitesize: https://www.bbc.co.uk/bitesize/subjects/z4882hv	Oak Academy online resources: https://classroom.thenational.academy/subjectsby-year/year-7/subjects/science https://classroom.thenational.academy/subjectsby-year/year-8/subjects/science BBC bitesize: https://www.bbc.co.uk/bitesize/subjects/z4882hv	Oak Academy online resources: https://classroom.thenational.academy/subjects-by-year/year7/subjects/science https://classroom.thenational.academy/subjects-by-year/year8/subjects/science BBC bitesize: https://www.bbc.co.uk/bitesize/subjects/z4882hv

Year 7 Science Curriculum: Chemistry			
	Autumn	Spring	Summer
Topic:	Chemistry: Particle model & Separating mixtures	Chemistry: Metals and Non-metals, Acids and Alkalis	Chemistry: Earth Structure & universe
Knowledge covered:	<p>Properties of solids, liquids and gases can be described in terms of particles in motion but with differences in the arrangement and movement of these same particles: closely spaced and vibrating (solid), in random motion but in contact (liquid), or in random motion and widely spaced (gas). Observations where substances change temperature or state can be described in terms of particles gaining or losing energy</p> <p>A pure substance consists of only one type of element or compound and has a fixed melting and boiling point. Mixtures may be separated due to differences in their physical properties. The method chosen to separate a mixture depends on which physical properties of the individual substances are different.</p>	<p>Metals and non-metals react with oxygen to form oxides which are either bases or acids. Metals can be arranged as a reactivity series in order of how readily they react with other substances. Some metals react with acids to produce salts and hydrogen.</p> <p>The pH of a solution depends on the strength of the acid: strong acids have lower pH values than weak acids. Mixing an acid and alkali produces a chemical reaction, neutralisation, forming a chemical called a salt and water.</p>	<p>Sedimentary, igneous and metamorphic rocks can be inter converted over millions of years through weathering and erosion, heat and pressure, and melting and cooling.</p> <p>The solar system can be modelled as planets rotating on tilted axes while orbiting the Sun, moons orbiting planets and sunlight spreading out and being reflected. This explains day and year length, seasons and the visibility of objects from Earth. Our solar system is a tiny part of a galaxy, one of many billions in the Universe. Light takes minutes to reach Earth from the Sun, four years from our nearest star and billions of years from other galaxies.</p>
Online resources:	<p>Oak Academy online resources: https://classroom.thenational.academy/subjects-byyear/year-7/subjects/science https://classroom.thenational.academy/subjects-byyear/year-8/subjects/science</p> <p>BBC bitesize links: https://www.bbc.co.uk/bitesize/guides/zgvc4wx/revision/1 https://www.bbc.co.uk/bitesize/guides/z2wmxnb/revision/1</p>	<p>Oak Academy online resources: https://classroom.thenational.academy/subjectsby-year/year-7/subjects/science https://classroom.thenational.academy/subjectsby-year/year-8/subjects/science</p> <p>BBC bitesize links: https://www.bbc.co.uk/bitesize/guides/z84wjxs/revision/4</p>	<p>Oak Academy online resources: https://classroom.thenational.academy/subjects-byyear/year-7/subjects/science https://classroom.thenational.academy/subjects-byyear/year-8/subjects/science</p>

Year 7 Science Curriculum: Physics			
	Autumn	Spring	Summer
Topic:	Physics: Energy –Costs and Transfers	Physics: Waves - Sound and Light	Physics Forces: Speed and Gravity
Knowledge covered:	<p>We pay for our domestic electricity usage based on the amount of energy transferred. Electricity is generated by a combination of resources which each have advantages and disadvantages.</p> <p>Calculate the cost of home energy usage, using the formula: cost = power (kW) x time (hours) x price (per kWh).</p> <p>We can describe how jobs get done using an energy model where energy is transferred from one store at the start to another at the end. When energy is transferred, the total is conserved, but some energy is dissipated, reducing the useful energy.</p>	<p>Sound consists of vibrations which travel as a longitudinal wave through substances. The denser the medium, the faster sound travels. The greater the amplitude of the waveform, the louder the sound. The greater the frequency.</p> <p>When a light ray meets a different medium, some of it is absorbed and some reflected. For a mirror, the angle of incidence equals the angle of reflection. The ray model can describe the formation of an image in a mirror and how objects appear different colours. When light enters a denser medium it bends towards the normal; when it enters a less dense medium it bends away from the normal. Refraction through lenses and prisms can be described using a ray diagram as a model.</p>	<p>If the overall, resultant force on an object is non-zero, its motion changes and it slows down, speeds up or changes direction.</p> <p>Mass and weight are different but related. Mass is a property of the object; weight depends upon mass but also on gravitational field strength. Every object exerts a gravitational force on every other object. The force increases with mass and decreases with distance. Gravity holds planets and moons in orbit around larger bodies.</p>
Online resources:	<p>Oak Academy online resources: https://classroom.thenational.academy/subjectsby-year/year-7/subjects/science https://classroom.thenational.academy/subjectsby-year/year-8/subjects/science</p>	<p>Oak Academy online resources: https://classroom.thenational.academy/subjectsby-year/year-7/subjects/science https://classroom.thenational.academy/subjectsby-year/year-8/subjects/science</p>	<p>Oak Academy online resources: https://classroom.thenational.academy/subjects-by-year/year7/subjects/science https://classroom.thenational.academy/subjects-by-year/year8/subjects/science</p>

Year 8 Science Curriculum: Biology			
	Autumn	Spring	Summer
Topic:	Biology: Breathing and digestion	Biology: Respiration and photosynthesis	Biology: Evolution and Inheritance
Knowledge covered:	<p>In gas exchange, oxygen and carbon dioxide move between alveoli and the blood. Oxygen is transported to cells for aerobic respiration and carbon dioxide, a waste product of respiration, is removed from the body. Breathing occurs through the action of muscles in the ribcage and diaphragm. The amount of oxygen required by body cells determines the rate of breathing.</p> <p>The body needs a balanced diet with carbohydrates, lipids, proteins, vitamins, minerals, dietary fibre and water, for its cells' energy, growth and maintenance. Organs of the digestive system are adapted to break large food molecules into small ones which can travel in the blood to cells and are used for life processes. Iron is a mineral important for red blood cells. Calcium is a mineral needed for strong teeth and bones. Vitamins and minerals are needed in small amounts to keep the body healthy</p>	<p>Respiration is a series of chemical reactions, in cells, that breaks down glucose to provide energy and form new molecules. Most living things use aerobic respiration but switch to anaerobic respiration, which provides less energy, when oxygen is unavailable. Yeast fermentation is used in brewing and breadmaking.</p> <p>Plants and algae do not eat, but use energy from light, together with carbon dioxide and water to make glucose (food) through photosynthesis. They either use the glucose as an energy source, to build new tissue, or store it for later use. Plants have specially adapted organs that allow them to obtain resources needed for photosynthesis. Iodine is used to test for the presence of starch.</p>	<p>Natural selection is a theory that explains how species evolve and why extinction occurs. Biodiversity is vital to maintaining populations. Within a species variation helps against environment changes, avoiding extinction. Within an ecosystem, having many different species ensures resources are available for other populations, like humans.</p> <p>Inherited characteristics are the result of genetic information, in the form of sections of DNA called genes, being transferred from parents to offspring during reproduction. Chromosomes are long pieces of DNA which contain many genes. Gametes, carrying half the total number of chromosomes of each parent, combine during fertilisation. The DNA of every individual is different, except for identical twins. There are more than one version of each gene e.g. different blood groups.</p>
Online resources:	<p>BBC Bitesize https://www.bbc.co.uk/bitesize/subjects/z4882hv</p> <p>Oak Academy https://classroom.thenational.academy/yeargroups/year-7 https://classroom.thenational.academy/yeargroups/year-8</p>	<p>BBC Bitesize https://www.bbc.co.uk/bitesize/subjects/z4882hv</p> <p>Oak Academy – https://classroom.thenational.academy/yeargroups/year-7 https://classroom.thenational.academy/yeargroups/year-8</p>	<p>BBC Bitesize https://www.bbc.co.uk/bitesize/subjects/z4882hv</p> <p>Oak Academy https://classroom.thenational.academy/year-groups/year-7 https://classroom.thenational.academy/year-groups/year-8</p>

Year 8 Science Curriculum: Chemistry			
	Autumn	Spring	Summer
Topic:	Chemistry: Climate and Resources	Chemistry: Periodic table and Elements	Chemistry: Chemical energy and Types of reaction
Knowledge covered:	<p>Carbon is recycled through natural processes in the atmosphere, ecosystems, oceans and the Earth's crust (such as photosynthesis and respiration) as well as human activities (burning fuels).</p> <p>Scientists have evidence that global warming caused by human activity is causing changes in climate. Methane and carbon dioxide are greenhouse gases. Earth's atmosphere contains around 78% nitrogen, 21% oxygen, <1% carbon dioxide, plus small amounts of other gases.</p> <p>There is only a certain quantity of any resource on Earth, so the faster it is extracted, the sooner it will run out. Recycling reduces the need to extract resources. Most metals are found combined with other elements, as a compound, in ores. The more reactive a metal, the more difficult it is to separate it from its compound. Carbon displaces less reactive metals, while electrolysis is needed for more reactive metals.</p>	<p>The elements in a group all react in a similar way and sometimes show a pattern in reactivity. As you go down a group and across a period the elements show patterns in physical properties. Metals are generally found on the left side of the table, non-metals on the right. Group 1 contains reactive metals called alkali metals. Group 7 contains non-metals called halogens. Group 0 contains unreactive gases called noble gases.</p> <p>Most substances are not pure elements, but compounds or mixtures containing atoms of different elements. They have different properties to the elements they contain. Particle diagrams are used to classify a substance as an element, mixture or compound and as molecules or atoms. Naming rules for simple compounds: change non-metal to -ide; mono, di, tri prefixes; and symbols of hydroxide, nitrate, sulphate and carbonate. The symbols of hydrogen, oxygen, nitrogen, carbon, hydrogen, iron, zinc, copper, sulphur, aluminium, iodine, bromine, chlorine, sodium, potassium and magnesium.</p>	<p>During a chemical reaction bonds are broken (requiring energy) and new bonds formed (releasing energy). If the energy released is greater than the energy required, the reaction is exothermic. If the reverse, it is endothermic.</p> <p>Combustion is a reaction with oxygen in which energy is transferred to the surroundings as heat and light. Thermal decomposition is a reaction where a single reactant is broken down into simpler products by heating. Chemical changes can be described by a model where atoms and molecules in reactants rearrange to make the products and the total number of atoms is conserved.</p>
Online resources:	<p>BBC Bitesize https://www.bbc.co.uk/bitesize/subjects/znxytrd</p> <p>Oak Academy https://classroom.thenational.academy/yeargroups/year-7 https://classroom.thenational.academy/yeargroups/year-8</p>	<p>BBC Bitesize https://www.bbc.co.uk/bitesize/subjects/znxytrd</p> <p>Oak Academy https://classroom.thenational.academy/yeargroups/year-7 https://classroom.thenational.academy/yeargroups/year-8</p>	<p>BBC Bitesize https://www.bbc.co.uk/bitesize/subjects/znxytrd</p> <p>Oak Academy https://classroom.thenational.academy/year-groups/year-7 https://classroom.thenational.academy/year-groups/year-8</p>

Year 8 Science Curriculum: Physics			
	Autumn	Spring	Summer
Topic:	Physics: Contact and Pressure	Physics: PD and Current Magnetism and Electromagnetism	Physics: Work, Heating and cooling Wave effects and properties
Knowledge covered:	<p>When the resultant force on an object is zero, it is in equilibrium and does not move, or remains at constant speed in a straight line. One effect of a force is to change an object's form, causing it to be stretched or compressed. In some materials, the change is proportional to the force applied. Know how to sketch the forces acting on an object and label their size and direction.</p> <p>Pressure acts in a fluid in all directions. It increases with depth due to the increased weight of fluid, and results in an upthrust. Objects sink or float depending on whether the weight of the object is bigger or smaller than the upthrust. Different stresses on a solid object can be used to explain observations where objects scratch, sink into or break surfaces. Know how to use the formula: fluid pressure, or stress on a surface = force (N)/area (m²).</p>	<p>We can model voltage as an electrical push from the battery, or the amount of energy per unit of charge transferred through the electrical pathway. In a series circuit, voltage is shared between each component. In a parallel circuit, voltage is the same across each loop. Components with resistance reduce the current flowing and shift energy to the surroundings. Calculate resistance using the formula: resistance (Ω) = potential difference (V) \div current (A).</p> <p>Current is a movement of electrons and is the same everywhere in a series circuit. Current divides between loops in a parallel circuit, combines when loops meet, lights up bulbs and makes components work. Around a charged object, the electric field affects other charged objects, causing them to be attracted or repelled. The field strength decreases with distance. Two similarly charged objects repel.</p> <p>An electromagnet uses the principle that a current through a wire causes a magnetic field. Its strength depends on the current, the core and the number of coils in the solenoid. The magnetic field of an electromagnet decreases in strength with distance.</p> <p>Magnetic materials, electromagnets and the Earth create magnetic fields which can be described by drawing field lines to show the strength and direction. The stronger the magnet, and the smaller the distance from it, the greater the force a magnetic object in the field experiences. Two 'like' magnetic poles repel and two 'unlike' magnetic poles attract. Field lines flow from the north-seeking pole to the south-seeking pole.</p>	<p>Work is done and energy transferred when a force moves an object. The bigger the force or distance, the greater the work. Machines make work easier by reducing the force needed. Levers and pulleys do this by increasing the distance moved, and wheels reduce friction.</p> <p>The thermal energy of an object depends upon its mass, temperature and what it's made of. When there is a temperature difference, energy transfers from the hotter to the cooler object. Thermal energy is transferred through different pathways, by particles in conduction and convection, and by radiation.</p> <p>When a wave travels through a substance, particles move to and fro. Energy is transferred in the direction of movement of the wave. Waves of higher amplitude or higher frequency transfer more energy.</p> <p>A physical model of a transverse wave demonstrates it moves from place to place, while the material it travels through does not, and describes the properties of speed, wavelength and reflection.</p>
Online resources	<p>BBC Bitesize</p> <p>Oak Academy https://classroom.thenational.academy/yeargroups/year-7 https://classroom.thenational.academy/yeargroups/year-8</p>	<p>BBC Bitesize</p> <p>Oak Academy https://classroom.thenational.academy/yeargroups/year-7 https://classroom.thenational.academy/yeargroups/year-8</p>	<p>BBC Bitesize</p> <p>Oak Academy https://classroom.thenational.academy/yeargroups/year-7 https://classroom.thenational.academy/yeargroups/year-8</p>

Year 9 Science Curriculum: Biology			
	Autumn	Spring	Summer
Topic:	Cells, Transport and Organisation	Organisation	Communicable diseases and preventing disease
Knowledge covered:	<p>The study of simple prokaryotic and eukaryotic cells from single-cell structures to organisms and how cells have become specialised. These small structures were first observed with the discovery of light microscopes and further enhanced due to the evolution of electron microscopy and calculations to ascertain actual sizes.</p> <p>A variety of processes are required to transport substances into and out of cells such as diffusion, osmosis and active transport and that exchange surfaces have become adapted to allow rapid exchange.</p> <p>The cell cycle and mitosis are key processes for cell growth and repair. Stem cells are undifferentiated cells which have the potential to become specialised; this has led to many recent scientific discoveries in plants and animal stem cells although there are emotive evaluative reasons for and against the use of stem cells for medical purposes.</p>	<p>Cells join to make tissues, different tissues make up organs, and different organs contribute to organ systems. The digestive system can be used to illustrate this relationship. Digestive enzymes are essential to the functioning of the digestive system. Enzymes work as a key would in a lock, the effectiveness of the enzyme is lessened if conditions move away from the optimal conditions. Different enzymes work within different environmental conditions to take action of different macronutrients.</p> <p>The circulatory system transports blood around the body. The human circulatory system consists of a heart and 3 types of blood vessel; artery, vein and capillary. These components work together as a double circulatory system. When problems occur within the circulatory system medical procedures may resolve the problem. Plants also have a transport system consisting of the xylem and phloem. Transpiration is the movement of water and mineral ions through a plant. The rate of transpiration is affected by many environmental factors. Water leaves the plant mainly via the stomata.</p> <p>The breathing system allows adequate gaseous exchange to occur at the alveoli through an effective ventilation process. Gas exchange causes differences in composition between inhaled and exhaled air. An individuals' vulnerability to a communicable disease can be affected a number of risk factors. These correlations can be studied using graphs. This can be illustrated by the wide range of cancer types and the risk factors that are associated with each.</p>	<p>How the concept of health is affected by communicable (infectious) diseases. Pathogens which are microorganisms that cause disease for example viruses, bacteria, fungi and protists can be spread by a variety of methods and infect both animals and plants. We can avoid communicable diseases by reducing contact with pathogens and using the body's natural barriers against them. Once inside the body our immune system is triggered which is usually a strong enough response to destroy the pathogen.</p> <p>A range of drugs such as vaccinations have been developed which enhance our body's natural system against pathogens and the use antibiotics from the 1940s have proved successful against a range of lethal diseases. However, the overuse of antibiotics has led to the development of antibiotic-resistant bacteria. Scientists are therefore discovering and developing new drugs through the process of clinical trials with varying levels of success.</p>
Online resources:	<p>BBC Bitesize</p> <p>Oak Academy</p>	<p>BBC Bitesize</p> <p>Oak Academy</p>	<p>BBC Bitesize</p> <p>Oak Academy</p>

Year 9 Science Curriculum: Chemistry			
	Autumn	Spring	Summer
Topic:	Atomic structure and the periodic table	Structure and bonding Earth's Atmosphere and resources	Chemical Reaction and Chemical Changes
Knowledge covered:	<p>The periodic table provides chemists with a structured organisation of the known chemical elements from which they can make sense of their physical and chemical properties. The historical development of the periodic table and models of atomic structure provide good examples of how scientific ideas and explanations develop over time as new evidence emerges. The arrangement of elements in the modern periodic table can be explained in terms of atomic structure which provides evidence for the model of a nuclear atom with electrons in energy levels.</p>	<p>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. Theories of bonding explain how atoms are held together in these structures.</p> <p>The use the Earth's natural resources to manufacture useful products. However, in order to operate sustainably, chemists seek to minimise the use of limited resources, use of energy, waste and environmental impact in the manufacture of these products. Chemists also aim to develop ways of disposing of products at the end of their useful life in ways that ensure that materials and stored energy are utilised. Pollution, disposal of waste products and changing land use has a significant effect on the environment, and environmental chemists study how human activity has affected the Earth's natural cycles, and how damaging effects can be minimised. The Earth's atmosphere is dynamic and forever changing. The causes of these changes are sometimes man-made and sometimes part of many natural cycles. The problems caused by increased levels of air pollutants require scientists and engineers to develop solutions that help to reduce the impact of human activity.</p>	<p>Understanding of chemical changes began when people began experimenting with chemical reactions in a systematic way and organizing their results logically. Knowing about these different chemical changes meant that scientists could begin to predict exactly what new substances would be formed and use this knowledge to develop a wide range of different materials and processes. It also helped biochemists 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'.</p>
Online resources:	<p>BBC Bitesize</p> <p>Oak Academy (lessons 1-20) https://classroom.thenational.academy/units/atomic-structure-and-periodic-table-c831</p>	<p>BBC Bitesize https://www.bbc.co.uk/bitesize/topics/z33rrwx https://www.bbc.co.uk/bitesize/topics/zysvv9q</p> <p>Oak Academy (lessons 1-13) https://classroom.thenational.academy/units/bonding-structure-and-the-properties-of-matter-e93f</p>	<p>BBC Bitesize https://www.bbc.co.uk/bitesize/topics/zt6ppbk</p> <p>Oak Academy (lessons 1-10) https://classroom.thenational.academy/units/chemical-changes-a5ba</p>

Year 9 Science Curriculum: Physics			
	Autumn	Spring	Summer
Topic:	Energy	Particle Model of Matter	Atomic Structure
Knowledge covered:	<p>Use an energy stores model and describe the processes, such as forces and electrical currents, through which energy can be transferred.</p> <p>Measure the work done by a force acting over a distance and use this concept to analyse energy changes in gravitational stores, through lifting and falling, and elastic potential stores during stretching using the relevant mathematical relationships. Explore the conservation of energy through changes in the gravitational, kinetic, and elastic stores.</p> <p>Explain the dissipation of energy during transfers such as those caused by friction or electrical heating, Describe and calculate efficiency during different energy changes, applied to a selection of electrical devices.</p> <p>Understand and explain the concept of power and how this power rating can be used to determine total energy change over time.</p>	<p>Use the particle model to explain changes in state and link this to total internal energy, specific latent heat and specific heat capacity.</p> <p>Know that if the temperature of the system increases, the increase in temperature depends on the mass of the substance heated, the type of material and the energy input to the system. Use given equations to calculate SLH and SHC.</p> <p>Be able to use the density equation to calculate relative densities of materials and link this back to the particle model and conservation of mass.</p> <p>Use the particle model to explain how increasing the volume in which a gas is contained, at constant temperature, can lead to a decrease in pressure. Use the given equation to calculate changes in gas pressure/temperature or volume.</p>	<p>Know an atom is not a fundamental particle but consists of 3 sub-atomic particles, namely the proton, neutron and electron. Know how it is we came to know this. Know the properties of these particles.</p> <p>Understand and be able to use nuclear notation. Understand the terms Ion, Ionisation, Isotope, contamination, irradiation and half-life and how these relate to specific uses. Understand the mechanisms isotopes use to become more stable. Know the nature of Alpha, Beta and Gamma radiation (and neutron emission) and their dangers and uses. Understand, interpret and be able to solve nuclear equations.</p>
Online resources:	<p>BBC Bitesize https://www.bbc.co.uk/bitesize/topics/zcckk2p</p> <p>Oak Academy (lessons 1-20) https://classroom.thenational.academy/units/atomic-structure-and-periodic-table-c831</p>	<p>BBC Bitesize https://www.bbc.co.uk/bitesize/topics/z33rrwx https://www.bbc.co.uk/bitesize/topics/zysvv9q</p> <p>Oak Academy (lessons 1-13) https://classroom.thenational.academy/units/bonding-structure-and-the-properties-of-matter-e93f</p>	<p>BBC Bitesize https://www.bbc.co.uk/bitesize/topics/zshssrd</p> <p>Oak Academy (lesson 1-11) https://classroom.thenational.academy/units/atomic-structure-d811</p>