	Reception	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11
Biology	Explore the natural world around them, making observations and drawing pictures of animals and plants. To be able to name some objects found in the natural world e.g. conker, acorns, pine cone, chestnut To know what a plant needs to grow and to be able to name some plants To be able to categorise farm and wild animals and pets To be able to name and describe some common bugs	**Plants:** Identify and name a variety of common wild and garden plants, including deciduous and evergreen trees Identify and describe the basic structure of a variety of common flowering plants, including trees. **Animals Including Humans:** Identify and name a variety of common animals including fish, amphibians, reptiles, birds and mammals Identify and name a variety of common animals that are carnivores, herbivores and omnivores Describe and compare the structure of a variety of common animals (fish, amphibians, reptiles, birds and mammals, including pets) Identify, name, draw and label the basic parts of the human body and say which part of the body is associated with each sense.	**Plants:** Observe and describe how seeds and bulbs grow into mature plants Find out and describe how plants need water, light and a suitable temperature to grow and stay healthy. **Animals Including Humans:** Notice that animals, including humans, have offspring which grow into adults Find out about and describe the basic needs of animals, including humans, for survival (water, food and air) Describe the importance for humans of exercise, eating the right amounts of different types of food, and hygiene. **Living Things and their Habitats:** Explore and compare the differences between things that are living, dead, and things that have never been alive Identify that most living things	**Plants**: Identify and describe the functions of different parts of flowering plants: roots, stem/trunk, leaves and flowers Explore the requirements of plants for life and growth (air, light, water, nutrients from soil, and room to grow) and how they vary from plant to plant Investigate the way in which water is transported within plants Explore the part that flowers play in the life cycle of flowering plants, including pollination, seed formation and seed dispersal. **Animals Including Humans:** Identify that animals, including humans, need the right types and amount of nutrition, and that they cannot make their own food; they get nutrition from what they eat	**Animals Including Humans:** Describe the simple functions of the basic parts of the digestive system in humans Identify the different types of teeth in humans and their simple functions Construct and interpret a variety of food chains, identifying producers, predators and prey **Living Things and their Habitats:** Recognise that living things can be grouped in a variety of ways Explore and use classification keys to help group, identify and name a variety of living things in their local and wider environment Recognise that environments can change and that this can sometimes pose dangers to living things.	**Animals Including Humans:** Describe the changes as humans develop to old age **Living Things and their Habitats:** Describe the differences in the life cycles of a mammal, an amphibian, an insect and a bird Describe the life process of reproduction in some plants and animals.	**Animals Including Humans:** Identify and name the main parts of the human circulatory system, and describe the functions of the heart, blood vessels and blood Recognise the impact of diet, exercise, drugs and lifestyle on the way their bodies **function** Describe the ways in which nutrients and water are transported within animals, including humans. **Living Things and their Habitat** Describe how living things are classified into broad groups according to common observable characteristics and based on similarities and differences, including microorganisms, plants and animals Give reasons for classifying plants and animals based on specific characteristics. **Evolution and Inheritance:** Recognise that living things have changed over time and that fossils provide information about living things that	**Cells** Identify features of animal and plant cells Identify life processes Describe the organs in some organ systems **Sexual reproduction in animals** Steps in animals sexual reproduction (humans) Name the male and female reproductive organs Describe stages in pregnancy and birth **Muscles and bones** Describe how muscles are used for breathing Describe how oxygen gets to muscles Structure and function of the skeleton **Ecosystems** Types of variation Adaptations of plants and animals Daily and seasonal changes and adaptations Transfer of energy in food chains	**Food and nutrition** What nutrients are and what they do Components of a balanced diet Steps in digestion and the organs involved (and the role of enzymes) Absorption (adaptations of the intestine) **Plants and their reproduction** Classification of plants What biodiversity means and why it is important Types of plant reproduction Steps in plant reproduction **Breathing and respiration** Describe aerobic respiration Understand how gases are exchanged in the lungs The role of blood in carrying oxygen Describe anaerobic respiration **Unicellular organisms** Understand different types of unicellular organisms	**Key concepts in Biology** Plant, animal and bacterial cells Specialised cells Using microscopes Enzymes *Testing foods* Transporting substances (diffusion, osmosis and active transport) **Cells and control** Stages in mitosis Growth in animals and plants Stem cells The nervous system including types of nerves, reflex arc and synapse *Structure and function of the brain* *Structure and function of the eye* **Genetics** *Sexual and asexual reproduction* Steps in meiosis Structure of DNA Steps in DNA extraction *Protein synthesis* Genetics (inheritance and mutation) *Mendel and genetics* Variation	**Health and disease** Communicable and non-communicable disease Cardiovascular disease Types of pathogens and pathogenic diseases *Virus life cycles* Defences against disease Steps in making medicine *Antibiotics and monoclonal antibodies* **Plant structures and functions** Recall the photosynthesis equation Factors affecting photosynthesis Understand how plants absorb water and mineral ions Transpiration and translocation *Plant adaptations* *Plant hormones* **Animal coordination and control** What hormones are and examples of human hormones *Metabolic rate* Hormones and the menstrual cycle Control of blood glucose and diabetes (types 1 and 2) *Thermoregulation*	**Exchange and transport in animals** Adaptations for transport The circulatory system Structure of the heart Components of blood Aerobic and anaerobic respiration **Ecosystems and material cycles** What an ecosystem is *Energy transfer* Abiotic factors Biotic factors *Assessing pollution* Parasitism and mutualism Biodiversity threats and conservation *Food security* Material cycles (water, nitrogen and carbon) *Rates of decomposition*

			live in habitats to which they are suited and describe how different habitats provide for the basic needs of different kinds of animals and plants, and how they depend on each other Identify and name a variety of plants and animals in their habitats, including microhabitats Describe how animals obtain their food from plants and other animals, using the idea of a simple food chain, and identify and name different sources of food.	Identify that humans and some other animals have skeletons and muscles for support, protection and movement.			inhabited the Earth millions of years ago Recognise that living things produce offspring of the same kind, but normally offspring vary and are not identical to their parents Identify how animals and plants are adapted to suit their environment in different ways and that adaptation may lead to evolution.		Understand the structure of microscopic fungi Describe the structure of protoctists Understand how unicellular organisms can be helpful and harmful The carbon cycle	**Natural selection and GM** Evidence for human evolution Understand Darwin's theory of evolution The classification system The differences between breeds and varieties *Tissue culture* Genetic modification including benefits and drawbacks *Fertilisers and biological control*	*Osmoregulation and structure and function of the kidneys*	
Chemistry	To be able to comment on the changes of the properties of objects e.g paint, ice and food Talk about some properties of materials e.g. reflective, soft, hard.	**Everyday Materials:** Distinguish between an object and the material from which it is made Identify and name a variety of everyday materials, including wood, plastic, glass, metal, water, and rock Describe the simple physical properties of a variety of everyday materials Compare and group together a	**Everyday Materials:** Identify and compare the suitability of a variety of everyday materials, including wood, metal, plastic, glass, brick, rock, paper and cardboard for particular uses Find out how the shapes of solid objects made from some materials can be changed by squashing, bending, twisting and stretching.	**Rocks:** Compare and group together different kinds of rocks on the basis of their appearance and simple physical properties Describe in simple terms how fossils are formed when things that have lived are trapped within rock Recognise that soils are made from rocks and organic matter.	**States of Matter:** Compare and group materials together, according to whether they are solids, liquids or gases Observe that some materials change state when they are heated or cooled, and measure or research the temperature at which this happens in degrees Celsius (°C) Identify the part played by	**Properties and changes of Materials:** Compare and group together everyday materials on the basis of their properties, including their hardness, solubility, transparency, conductivity (electrical and thermal), and response to magnets Know that some materials will dissolve in liquid to form a solution, and describe how to recover a		**Mixtures and separation** Define mixtures Describe solutions, solutes and solvents Use evaporation to separate solutions Use chromatography to separate colours Use distillation to produce pure water **Acids and alkalis** Know what some hazards are and how to stay safe Understand what indicators do	**Combustion** Describe what happens when fuels are burned Write word equations for oxidation Understand how combustion can lead to air pollution and global warming **The Periodic table** Describe Dalton's atomic model Describe the differences between chemical properties and physical trends Describe chemical trends	**States of matter; separating mixtures** States of matter Mixtures Separating mixtures (chromatography, filtration, distillation, crystallisation) Making drinking water **Atomic structure** Structure of the atom Using the periodic table to see atomic number and mass Isotopes **The Periodic table**	**Calculations involving masses** Calculating empirical formulae Law of conservation of mass Concentration calculations Moles **Electrolysis and metals** Principles of electrolysis Products from electrolysis The reactivity series Extracting metals from ores Oxidation and reduction Life cycle assessment and recycling	**Groups in the Periodic table, rates of reaction** Trends in groups 1,7 and 0 Rates of reaction Factors affecting rates of reaction Catalysts and activation energy Exothermic and endothermic reactions **Fuels, earth and atmosphere** Hydrocarbons in crude oil and natural gas Fractional distillation of crude oil Breaking down hydrocarbons Complete and incomplete combustion The early and modern atmosphere

		variety of everyday materials on the basis of their simple physical properties.			evaporation and condensation in the water cycle and associate the rate of evaporation with temperature.	substance from a solution Use knowledge of solids, liquids and gases to decide how mixtures might be separated, including through filtering, sieving and evaporating Give reasons, based on evidence from comparative and fair tests, for the particular uses of everyday materials, including metals, wood and plastic Demonstrate that dissolving, mixing and changes of state are reversible changes Explain that some changes result in the formation of new materials, and that this kind of change is not usually reversible, including changes associated with burning and the action of acid on bicarbonate of soda.		Use the pH scale to measure acidity and alkalinity Carry out neutralisation **<u>The particle model</u>** Draw solids, liquids and gases using the particle model Understand the properties of solids, liquids and gases Describe Brownian motion and the evidence for this Describe diffusion in fluids Understand how air pressure is caused. **<u>Atoms, elements and molecules</u>** What air is made of Where elements come from Metals and non-metals What compounds are What happens in chemical reactions	**<u>Metals and their uses</u>** Describe the properties of metals Describe the reactions of metals with water and acids Describe the differences between alloys and pure metals **<u>Rocks</u>** Uses of rocks e.g. in building How igneous, metamorphic and sedimentary rocks are formed The fossil record Getting materials from the Earth	How elements are arranged in groups and periods Atomic number and the Periodic table Electron configuration **<u>Bonding</u>** Ionic bonding and properties of ionic compounds Covalent bonding Properties of molecular compounds Allotropes of carbon Properties of metals Advantages and disadvantages of bonding models **<u>Acids and alkalis</u>** Definitions of acids, alkalis and indicators The pH scale Neutralisation (with bases, carbonates and metals) Solubility	Dynamic equilibrium *Transition metals* *Corrosion* *Electroplating* *The process of alloying* *Uses of metals and their alloys* ***<u>Quantitative analysis, equilibria, chemical and fuel cells</u>*** • *Yields* • *Atom economy* • *Concentrations* • *Titration calculations* • *Molar volumes of gases* • *Fertilisers and the Haber process* • *Factors affecting equilibrium* • *Chemical cells and fuel cells*	***<u>Hydrocarbons, alcohols, carboxy polymers</u>*** *Structure and reactions of alkanes and alkenes* *Ethanol production* *Alcohols* *Carboxylic acids* *Polymerisation (addition and condensation)* *Polymer problems* ***<u>Qualitative analysis and materials</u>*** *Flame tests and photometry* *Tests for positive ions* *Tests for negative ions* *Choosing materials* *Composite materials* *Nanoparticles*
Physics	To be able to name the four seasons and the connected weather To observe seasonal changes and discuss these.	**<u>Seasonal Changes:</u>** Observe changes across the four seasons Observe and describe weather associated with the seasons and how day length varies.		**<u>Light:</u>** Recognise that they need light in order to see things and that dark is the absence of light Notice that light is reflected from surfaces	**<u>Sound:</u>** Identify how sounds are made, associating some of them with something vibrating Recognise that vibrations from sounds travel	**<u>Forces:</u>** Explain that unsupported objects fall towards the Earth because of the force of gravity acting between the Earth and the falling object	**<u>Light</u>**: Recognise that light appears to travel in straight lines Use the idea that light travels in straight lines to explain that objects are seen because they give	**<u>Energy</u>** Know that food contains energy and how this can be measured Understand energy transfers and stores Describe what fuels are	**<u>Fluids</u>** Using the particle model Describe changes of state Describe how pressure in fluids is created	**<u>Conservation of Energy</u>** Energy Stores and Transfers Energy Efficiency Keeping Warm Stored Energies	**<u>Light and the Electromagnetic Spectrum</u>** *Ray diagrams* *Colour* *Lenses* EM waves EM spectrum	**<u>Electricity and Circuits</u>** Electric circuits Current and potential difference Current charge and energy Resistance More about resistance Transferring energy Power

	To categorise objects into some characteristics e.g. sinking and floating			Recognise that light from the sun can be dangerous and that there are ways to protect their eyes Recognise that shadows are formed when the light from a light source is blocked by an opaque object Find patterns in the way that the size of shadows change. **Forces and Magnets:** Compare how things move on different surfaces Notice that some forces need contact between two objects, but magnetic forces can act at a distance Observe how magnets attract or repel each other and attract some materials and not others Compare and group together a variety of everyday materials on the basis of whether they are attracted to a magnet, and identify some magnetic materials	through a medium to the ear Find patterns between the pitch of a sound and features of the object that produced it Find patterns between the volume of a sound and the strength of the vibrations that produced it Recognise that sounds get fainter as the distance from the sound source increases. **Electricity:** Identify common appliances that run on electricity Construct a simple series electrical circuit, identifying and naming its basic parts, including cells, wires, bulbs, switches and buzzers Identify whether or not a lamp will light in a simple series circuit, based on whether or not the lamp is part of a complete loop with a battery Recognise that a switch opens and closes a circuit and associate this with whether or	Identify the effects of air resistance, water resistance and friction, that act between moving surfaces Recognise that some mechanisms, including levers, pulleys and gears, allow a smaller force to have a greater effect. **Earth and Space:** Describe the movement of the Earth, and other planets, relative to the Sun in the solar system Describe the movement of the Moon relative to the Earth Describe the Sun, Earth and Moon as approximately spherical bodies Use the idea of the Earth's rotation to explain day and night and the apparent movement of the sun across the sky.	out or reflect light into the eye Explain that we see things because light travels from light sources to our eyes or from light sources to objects and then to our eyes Use the idea that light travels in straight lines to explain why shadows have the same shape as the objects that cast them. **Electricity**: Associate the brightness of a lamp or the volume of a buzzer with the number and voltage of cells used in the circuit Compare and give reasons for variations in how components function, including the brightness of bulbs, the loudness of buzzers and the on/off position of switches Use recognised symbols when representing a simple circuit in a diagram.	Understand sources of renewable energy **Current electricity** Understand how to make a series and parallel circuit How to use switches in circuits Describe some models for circuits and their limitations Measure current and voltage with ammeters and voltmeters Describe dangers of electricity and ways to stay safe **Forces** Give examples of forces Use a newtonmeter to measure forces Understand what friction does Understand how pressure is made and the equation for pressure Understand balanced and unbalanced forces **Sound** Understand how sounds are made Describe how soundwaves can be seen Identify the structure of the ear	Describe forces in floating and sinking Drag as a type of friction **Light** Describe luminous and non-luminous objects Describe how we see things Understand reflection, refraction and dispersion Understand how we see colour **Energy transfers** Understand how to measure temperature changes Describe conduction, convection and radiation Describe insulation Understand how to calculate efficiency and how payments for energy are calculated Earth and space Evidence for the heliocentric model of the solar system Describe how seasons happen How the Earth has a magnetic field How gravity varies Beyond the solar system	Non-renewable resources Renewable resources **Motion** Vectors and Scalars Distance time graphs Acceleration Velocity time graphs **Motion and Forces** Resultant forces Newtons first law Newtons second law Newtons third law Mass and weight Momentum Stopping distances *Braking distance and energy* Crash hazards **Waves** Describing waves Wave speed Refraction *Waves crossing boundaries* *Ears and hearing* *Ultrasound* *Infrasound*	Using long waves *Radiation and temperature* Using short waves EM dangers **Radioactivity** Atomic models Inside atoms Electrons and orbits Background radiation Types of radiation Radioactive decay Half life Using radioactivity Dangers of radioactivity *Radioactivity in medicine* *Nuclear energy* *Nuclear fission* *Nuclear fusion* **Astronomy** *The solar system* *Gravity and orbits* *Lifecycle of stars* *Red shift* *Origins of the universe* **Energy – Forces Doing Work** Work and power Forces and their Effects Objects affecting each other	Transferring energy by electricity Electrical safety **Magnetism and the Motor Ef** Magnets and magnetic fields Electromagnetism Magnetic forces **Electromagnetic Induction** *Electromagnetic induction* *The national grid* Transformers and energy **Particle Model** Particles and density Energy and changes of state Energy calculations Gas temperature and pressure *Gas pressure and volume* **Forces and Matter** Bending and stretching Extension and energy transfers *Pressure in fluids* *Pressure and upthrust*

				Describe magnets as having two poles Predict whether two magnets will attract or repel each other, depending on which poles are facing.	not a lamp lights in a simple series circuit Recognise some common conductors and insulators, and associate metals with being good conductors.			Describe how sound can be used by animals and humans			Vector diagrams *Rotational forces* **<u>Static Electricity</u>** *Charges and static electricity*	