Progression in science at The Valley School - Knowledge statements

States of matter	
Pre 7	1.Understand some important processes and changes in the natural world around them, including changing states of matter.
Year 7	1.Identify a solid, liquid and gas from a selection. 2.Compare and group materials together based on whether they are a solid, liquid or gas. 3.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). 4.Describe the differences between a solid, liquid and gas.
Year 8	1.Identify the part played by evaporation and condensation in the water cycle and associate the rate of evaporation with temperature. 2. Use knowledge of solids, liquids and gases to decide how mixtures might be separated, including through filtering, sieving and evaporating. 3. Demonstrate that dissolving, mixing and changes of state are reversible changes. 4. 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. 5. Find out about how chemists create new materials, for example, Spencer Silver, who invented the glue for sticky notes or Ruth Benerito, who invented wrinkle-free cotton.
Year 10	1.Explain states of matter using the particle model. 2.Explain changes of state using the particle model. 3. Describe the physical states of products and reactants using state symbols: (s), (l), (g) and (aq). 4. Know that during a change of state the mass of the substance remains the same. 5. Know that some reactions may be reversed e.g. forward reaction: a+b g c+d and backwards: c+d g a+b.
Year 11	1.Explain what is meant by the purity of a substance, distinguishing between the scientific and everyday use of the term 'pure'. 2.Know that a mixture contains two or more un-combined substances. 3.Know that mixtures contain substances that can be separated from each other. 4.Suggest suitable separation techniques given information about the substances. 5.Be able to plan how to obtain a soluble substance (e.g. salt, copper sulfate or sugar) from an aqueous solution by crystallisation 6.Be able to plan how to a separate an insoluble substance from water by filtration e.g. sand. 7.Know how chromatography is used to separate mixtures into their constituents.

	8.Interpret simple chromatograms. 9.Suggest how chromatography can be used to test pure from impure substances. 10.Following a chromatography experiment measure the distance moved by the solvent and the spots 11.Calculate the Rf value from the spots by dividing the distance moved by the spot by the distance moved by the solvent. 12.Understand that distillation is used to separate liquids with different boiling points. 13,Know that distillation is used to produce some alcoholic drinks, e.g. whisky. 14.Use melting point data to distinguish pure from impure substances. 15.Know how drinking water is purified. 16.Know that the Earth is surrounded by a mixture of gases called the atmosphere. 17.Know how the atmosphere was formed and has changed over time 18.Know that the atmosphere now contains about 80% nitrogen and 20% oxygen. 19.Know that there are smaller amounts of water vapour, carbon dioxide and other gases in the air. 20.Know that fuels contain carbon, which forms carbon dioxide when the fuel burns 21.Know how to test for the presence of carbon dioxide 22.Know that the amount of carbon dioxide in the atmosphere is slowly increasing. 23.Know that the increasing level of carbon dioxide is linked to global warming. 24,Know that burning fuels may add harmful chemicals into the atmosphere. 25.Know that these harmful chemicals are called pollutants. 26.Understand some of the problems these pollutants cause. 27.Know that carbon monoxide forms when fuels from crude oil burn in a limited supply of air. 28.Know that fossil fuels contain small amounts of sulfur which are released as sulfur dioxide when the fuel is burnt. 29.Know that sulfur dioxide is a cause of acid rain. 30.Know that nitrogen and oxygen from the air can make nitrogen oxides in a car engine. 31.Know that a catalytic converter gets rid of pollutants like nitrogen oxides. 32.Interpret simple data on the removal of pollutants from car exhausts. 33.Be able to state the benefits and drawbacks of using catalytic converters. 34.Know that exhaust gas emissions are part of an MOT vehicle test.

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Evolution	
Pre 7	1.Know that humans are made by other humans. 2. Know that some animals are born from eggs and others are born from reproduction.
Year 7	1. Recognise that living things have changed over time and that fossils provide information about living things that inhabited the Earth millions of years ago. 2.Recognise that living things produce offspring of the same kind, but normally offspring vary and are not identical to their parents.
Year 8	1.Identify how animals and plants are adapted to suit their environment in different ways and that adaptation may lead to evolution.
Year 10	1.Know that most human features are determined by a person's genes. 2.Be able to classify a range of human features as genetic: e.g. tongue rolling, ear lobes, environmental e.g. scars, accent, and both e.g. hair colour, good at sport. 3.Understand that environment also affects many features. 4.Understand that most features are affected by several genes, e.g. height. 5.Interpret data on human variation. 6.Know that some genes are dominant and some are recessive. 7.Know how to use simple Punnett squares to show inheritance of genotype ratios.
Year 11	1.Know that fossils provide evidence of living organisms from long ago to include fossil formation. 2. Know that living things have been changing through evolution. 3. Know that some species have changed very little over thousands of years e.g. crocodiles. 4.Know that all variations in a species arise from mutations. 5.Be able to identify variations in animals or plants of the same species [no recall expected]. 6. Understand the term species. 7. Know that some species have changed very little over thousands of years e.g. crocodiles. 8. Be able to identify variations in animals or plants of the same species [no recall expected]. 11. Understand that living things compete for shelter, food and mates, in order to survive. 12. Know that the better adapted individuals will survive and can breed and pass on their features to the next generation. 13. Understand the term habitat.

	14. Understand that a species may become extinct if their habitat changes or another species is better adapted to survive there. 15. Understand how human beings have caused some species to become endangered or extinct: habitat destruction, hunting, pollution.
Materials	
Pre 7	1.Know the names of some everyday objects i.e table, chair, window 2.Know the material some everyday objects are made of
Year 7	1. Distinguish between an object and the material from which it is made 2. Identify and name a variety of everyday materials, including wood, plastic, glass, metal, water, and rock 3. Describe the simple physical properties of a variety of everyday materials 4. Compare and group together a variety of everyday materials on the basis of their simple physical properties 5.Understand and explain the difference between the words object and material 6. Describe the properties of materials using the following key terms; hard/soft; stretchy/stiff; shiny/dull; rough/smooth; bendy/not bendy; waterproof/not waterproof; absorbent/not absorbent; opaque/transparent. 7. Find out about people who have developed useful new materials - John Dunlop and John McAdam.
Year 8	1. Describe the simple physical properties of a variety of everyday materials. 2. Compare and group together a variety of everyday materials on the basis of their simple physical properties. 3.Find out how the shapes of materials can change if they are squash, bent, squeeze or twisted. 4. Identify and compare the suitability of a variety of everyday materials, including wood, metal, plastic, glass, brick, rock, paper and cardboard for particular uses. 5. Describe how the properties of materials make them suitable or unsuitable for particular purposes 6. Find out about people who have developed useful new materials - Charles Macintosh 7. Compare the uses of everyday materials in and around the school with materials found in other places
Year 10	1. Understand what elastic is and how it is used for different purposes. 2. Know that a stretched elastic band exerts a force. 3.Know that crude oil is a toxic, dark, sticky liquid. 4.Know that crude oil is made mainly of hydrocarbons in chains of varying length. 5.Know that hydrocarbons are composed of hydrogen and carbon. 6.Recognise that the formula of hydrocarbons will contain carbons, hydrogens and numbers.

	7.Know that you can calculate the number of hydrogens on a simple hydrocarbon by counting the carbons, multiplying this number by 2 and adding two to the answer. 8.Know that modern life is crucially dependent upon hydrocarbons from crude oil and recognise that crude oil is a finite resource. 9.Know that crude oil is a good source of hydrocarbons that are used to make many products we enjoy and rely on. 10.Know that crude oil can be separated into more useful parts at an oil refinery. 11.Know the uses of these fuels: petroleum gases, such as propane, in portable gas cylinders; petrol in cars; kerosene in airplanes; diesel in lorries, buses, trains and cars. 12.Understand that some fuels ignite more easily than others do and that this is important for their uses. 13.Know that burning fuels produces energy for heating, transport and making electricity in power stations. 14.Be able to label the apparatus used to find out how much energy a flame gives out. 15.Interpret data to decide which fuel gives out most energy when the same amount burns. 16.Give one advantage and one disadvantage of petrol and diesel for transport. 17.Interpret simple information about the use of different fuels [no recall expected]. 18.Understand that people can make choices about which fuels to use. 19.Know that hydrocarbons can be made into smaller molecules by a process called cracking and that the products of cracking can be used to make plastics. 20.Know that plastics are made from these small molecules called monomers. 21.Know that lots of monomers join together to form a long chain polymer 22.Know that carbon can form four bonds (covalent). 23.Know that carbon can form many compounds because it can arrange itself into a variety of shapes limited to chains and rings. 24.Explain the properties of diamond, graphite, fullerenes and graphene in terms of their structures and bonding. 25.Using graphite and diamond explain that their different properties are related to the arrangements of bonds they contain. 26.Interpret simple data comparing the properties of different materials [no recall expected]. 27.Know that a composite material contains at least two different materials. 28.Know that an alloy is a mixture of two or more elements, at least one of which is a metal. 29.Know the names and one use of the alloys: steel, solder, aluminium alloy and brass. 30.Know that the properties of alloys are different from the properties of the metals from which they are made. 31..Interpret information linking the properties of materials to their uses [no recall expected]. 32.Understand the term 'smart' alloy

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Year 11	1.Describe the properties of metals on the basis of their characteristic physical and chemical properties. 2.Position carbon in the reactivity series of metals. 3.Know how some metals (e.g. iron and copper) can be extracted by heating its ore with carbon. 4. Know how some metals (e.g. iron and copper) can be extracted by heating its ore with carbon. 5.Explain reduction and oxidation in terms of loss or gain of oxygen, identifying if iron is being reduced or oxidised when rusting. 6.Know that paints are used to decorate or protect surfaces. 7.Know that salt water speeds up rusting. 8.Be able to describe similarities and differences between the properties of iron and aluminium, limited to: iron is more dense than aluminium; iron is magnetic; aluminium is not; iron corrodes (rusts) easily and aluminium does not. 9.Know that electrolysis is used to extract some metals (e.g. aluminium) from their ores because they are more reactive than carbon. 10.Know that the aluminium is formed at the cathode non-metals are formed at the anode in electrolysis using inert electrodes. 11.Recall one advantage and one disadvantage of making cars from aluminium. 12.Interpret simple information about metals used to make cars [no recall expected]. 13.Understand why metals are worth recycling (metals are a finite resource and recycling metal is cheaper than making it from the ore and that it saves resources and energy). 14.Interpret information on the recycling of materials [no recall expected]. 15. Be able to label simple laboratory apparatus used to obtain a dye from a plant (limited to beaker, stirring rod, heating apparatus, filter funnel, filter paper and mortar and pestle). 16.Know that the colour of some dyes can be changed by adding acids and alkalis 17.Understand safety precautions when using acids or alkalis 18.Interpret simple information about the use of indicators to classify solutions as acid, neutral or alkali. 19.Know how to use the pH scale. 20.Know that pH can be measured electronically 21.Know that neutralisation occurs when acids and alkalis are mixed. 22.Know that acids produce protons (H+) and alkalis produce hydroxide ions (OH-). 23.Know that when you mix acids and alkalis together the protons (H+) and hydroxide ions (OH-) form H2O this is called neutralisation

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Seasonal Change	
Pre 7	1.Understand some important processes and changes in the natural world around them, including the seasons.
Year 7	1.Observe changes across the 4 seasons.
Year 8	1.Observe and describe weather associated with the seasons and how day length varies.
Forces	
Year 7	1. Explain that unsupported objects fall towards the Earth because of the force of gravity acting between the Earth and the falling object. 2. Identify the effects of air resistance, water resistance and friction, that act between moving surfaces. 3. Explore the effects of air resistance by observing how different objects such as parachutes and sycamore seeds fall. 4. Explore the effects of friction on movement and find out how it slows or stops moving objects, for example, by observing the effects of a brake on a bicycle wheel. 5. Understand that Galileo Galilei and Isaac Newton helped to develop the theory of gravitation.
Year 9	1.Know how to induce magnetism in a pin. 2.Know that magnets attract magnetic materials: limited to iron and steel. 3.Know that iron and steel are magnetic. 4.Know that like poles repel and unlike poles attract. 5.Know how iron filings or a compass can be used to show up a magnetic field. 6.Know that a freely swinging magnet comes to rest in a N-S direction. 7.Know that the Earth has a magnetic field around it. 8. Understand how a compass works and why it is so useful. 9. Know that the Earth's magnetic field protects us from cosmic rays. 10. Know that a current-carrying wire behaves like a magnet. 11.Know how to construct an electromagnet. 12. Understand how the strength of an electromagnet depends on: the number of turns on the coil, the current in the coil.

	13.Understand that the core of an electromagnet is made of iron because iron is a temporary magnet. 14.Know that the strength of the field depends on the current and the distance from the conductor, and explain how solenoid arrangements can enhance the magnetic effect. 15.Be able to label the magnet, core and cone in a loudspeaker. 16.Be able to plan how to compare how the number of turns on the coil (or strength of magnet) affects how well a loudspeaker works. 17.Recall uses of electromagnets limited to: MRI scan, sorting scrap metals, lifting iron/steel/cars.
Year 10	1.Know that forces are measured in Newtons. 2.Understand that unbalanced forces change the motion of an object. 3.Understand that weight is due to the force of gravity. 4.Know that an objects gravitational potential energy is composed of its mass, height and gravity. 5.Know that falling objects are acted on by gravity and drag. 6.Understand the effect of air resistance on falling objects. 7.Know that falling objects can reach a maximum speed. 8.Know that a stretched elastic band exerts a force. 9.Know that an increased force increases the length of an elastic material. 10.Give a simple description of the relationship between force and extension in stretching a spring. 11.Know that the extension of an elastic material is proportional to the force applied to it. 12.Know that elastic materials return to their original shape unless the force becomes too big. 13.Apply the relationship between work done = force × distance moved.
Light	
Pre 7	1.Discuss what activities take place in the day and at night (going to sleep, going to school, eating breakfast)
Year 7	1. Know that everywhere on earth experiences day and night. 2. Describe the differences between day and night.
Year 8	1. Recognise that we need light in order to see things and that dark is the absence of light. 2. Notice that light is reflected from surfaces. 3. Recognise that light from the sun can be dangerous.

	4. Recognise that shadows are formed when the light from a light source is blocked by an opaque object. 5. Find patterns in the way that the size of shadows changes. . 6.Recognise that light appears to travel in straight lines. 7. 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. 8. Use the idea that light travels in straight lines to explain why shadows have the same shape as the objects that cast them.
Year 10	1. Recall some medical uses of UV radiation. 2. Know that exposure to UV radiation can cause suntan, sunburn and skin cancer. 3. Understand that the use of UV radiation involves balancing benefits against risk. 4. Recall some ways of reducing the risk of exposure to UV radiation. 5. Interpret data on the use of sunscreens [no recall expected]. 6. Understand that bone absorbs X-rays and so produces shadow pictures. 7.Know that too much exposure to X-rays is dangerous. 8. Understand that the use of X-rays involves balancing benefits against risk. 9. Know that gamma radiation is very penetrating. 10. Know that a gamma camera detects gamma radiation and that a computer linked to it can make pictures. 11. Know that exposure to gamma rays is dangerous. 12. Understand that the use of gamma rays involves balancing benefits against risk. 13.Know that UV radiation, X-rays and gamma rays are part of a family called the electromagnetic spectrum. 14.Know that UV radiation, X-rays and gamma rays can damage living cells. 15. Know that visible light is part of a group of waves called the electromagnetic spectrum. 16. Know that all waves from the electromagnetic spectrum travel at the speed of light. 17. Be able to list the colours of the visible spectrum in order from red to violet. 18. Know that a rainbow is a naturally occurring example of the visible spectrum. 19. Know that a visible spectrum can be produced when white light passes through a prism. 20. Recall uses of lasers limited to: read CDs, light shows, pointers, weapon guidance, cutting tools. 21. Know that warm and hot objects emit infrared radiation. 22. Know that passive infrared sensors and thermal imaging cameras work by detecting body heat. 23. Know that infrared is useful for: remote control for TV etc.; short distance data links for computer or mobile phone; night photography; burglar alarms; heating things, e.g. electric fire, toaster, grill. 24. Recall two examples of uses of microwave radiation from: cooking; mobile phones; radar; communication with satellites. 25. Know that microwaves cause heating when absorbed by water or fat and this is the basis of microwave cooking.

	26. Know that radio waves produce electrical signals in metal aerials. 27. Know that a laser produces a narrow, intense beam of light.
Electricity	
Year 7	1.Identify common appliances that run on electricity. 2.construct a simple series electrical circuit, identifying and naming its basic parts, including cells, wires, bulbs, switches and buzzers. 3.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. 4.recognise that a switch opens and closes a circuit and associate this with whether or not a lamp lights in a simple series circuit. 5.recognise some common conductors and insulators, and associate metals with being good conductors. 6.associate the brightness of a lamp or the volume of a buzzer with the number and voltage of cells used in the circuit 7.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. 8.use recognised symbols when representing a simple circuit in a diagram.
Year 11	1. Recall two examples of uses of radio waves: radio; wireless links for laptop computers. 2. Understand the advantages of wireless technology for global communications. 3.Explain the difference between direct and alternating voltage. 4.Know that batteries produce d.c. electricity from chemical reactions. 5.Know that the domestic supply in the UK is a.c. (at 50 Hz and about 230 volts). 6.Know the main stages in the production of electricity: heat from the energy source changes water into steam, the steam is used to rotate turbines, turbines turn a generator, and the generator produces electricity. 7.Understand the terms insulator and conductor. 8.Understand that transformers are required at either end of the transmission lines to increase or decrease voltage. 9.Know that a transformer is two coils of wire wound onto a core of iron. 10.Know that electricity in the home is conducted by wires. 11.Know the differences in function between the live, neutral and earth mains wires, and the potential differences between these wires; hence explain that a live wire may be dangerous even when a switch in a mains circuit is open, and explain the dangers of providing any connection between the live wire and earth. 12.Know that current is a rate of flow of charge, that for a charge to flow, a source of potential difference and a closed circuit are needed and that a current has the same value at any point in a single closed loop.

	13.Know and use the relationship between quantity of charge, current and time. 14.Know that current (I) depends on both resistance (R) and potential difference (V) and the units in which these are measured. 15.Know and apply the relationship between I, R and V, and that for some resistors the value of R remains constant but that in others it can change as the current changes. 16.Explain the design and use of circuits to explore such effects – including for lamps, diodes, thermistors and LDRs. 17.Describe the difference between series and parallel circuits, explain why, if two resistors are in series the net resistance is increased, whereas with two in parallel the net resistance is decreased (qualitative explanation only). 18.Calculate the currents, potential differences and resistances in d.c. series circuits, and explain the design and use of such circuits for measurement and testing purposes; represent them with the conventions of positive and negative terminals, and the symbols that represent common circuit elements, including diodes, LDRs and thermistors. 19.Know ways of reducing energy loss from the home. Interpret data for different energy saving strategies focusing on the choice of energy saving appliances [no recall expected]. 20. Know that electricity is transferred from a power station through a grid of high voltage transmission lines. 21. Know that some appliances use more electricity than others.
Animals Including Humans	
Pre 7	1.Explore the natural world around them by recognising and naming some common animals
Year 7	1.identify and name a variety of common animals including fish, amphibians, reptiles, birds and mammals 2.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) 3.identify, name, draw and label the basic parts of the human body and say which part of the body is associated with each sense 4.explore and compare the differences between things that are living, dead, and things that have never been alive. 5.identify that most living things 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. 6.identify and name a variety of plants and animals in their habitats, including microhabitats. 7.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.

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Year 8	1.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 2.identify that humans and some other animals have skeletons and muscles for support 3.recognise the impact of diet, exercise, drugs and lifestyle on the way their bodies function 4.describe the ways in which nutrients and water are transported within animals, including humans describe the simple functions of the basic parts of the digestive system in humans 5.identify the different types of teeth in humans and their simple functions 6.construct and interpret a variety of food chains, identifying producers, predators and prey 7. identify and name the main parts of the human circulatory system, and describe the functions of the heart, blood vessels and blood
	CSI PLUS 1. Know that anyone present at a crime scene will leave some evidence behind 1. Understand why crime scene investigators wear special clothing to avoid leaving evidence at a crime scene. 2. Know how an investigator collects evidence at a crime scene – in precisely labelled evidence bags 3. Know fingerprints are left on a surface because oils from the skin are deposited. 4. Know how dusting a surface with a special powder can make fingerprints show up. 5. Know how fingerprints can be removed from a surface. 6. Know how to make a record of a person's fingerprints. 7. Understand that innocent people have their fingerprints taken for elimination. 8. Recognise loop, arch and whorl as features of fingerprints. 9. Know that no two people have identical fingerprints – not even identical twins. 10. Know that blood contains red blood cells, white blood cells, platelets and plasma. 11. Recall that the main blood groups are A, B, AB and O 12. Know how chromatography can be used to separate colours in ink. 13. Understand how the results of separating colours can identify a particular ink as being used e.g. to write a forged cheque. 14. Know that enzymes act as catalysts in biological systems. 15. Know that identical twins have identical DNA but otherwise DNA is unique. 16. Interpret data from a crime scene and decide whether or not it confirms a suspect's presence.

	FOOLING YOUR SENSES 1.Be able to label a diagram of the eye (limited to cornea, iris, pupil, lens, retina, optic nerve). 2.Recall the job of the pupil, lens, retina, optic nerve and iris. 3.Know that the nose is lined with nerves sensitive to chemicals in the air. 4.Know that pressure sensors are deeper than pain sensors. 5.Know that some areas of skin contain more nerve endings than others. 6.Recall that taste buds are located on the tongue and are sensitive to four tastes: salt, sweet, sour, bitter. 7.Know that different areas of the tongue are more sensitive to different tastes. 8. Understand that the flavour of food diminishes when we have a cold and cannot smell. 9.Know that sensor (receptor) cells detect stimuli, and effector cells (muscles) produce a response. 10.Understand the need for simple reflex actions, i.e. for protection. 11.Recall examples of simple reflex actions limited to knee jerk, iris, touching a hot surface. 12.Interpret simple data on reaction times. 13.Know that the skin contains sensory nerves for touch, temperature, pain and pressure. 14. Know that pressure sensors are deeper than pain sensors. 15.Know that some areas of skin contain more nerve endings than others.
Year 11	1.Understand that changes in our surroundings can affect our body's internal environment. 2.Understand that the body's internal environment can change and that the body tries to control this change, use temperature regulation as an example. 3.Know the ways the body gains or loses water. 4.Be able to name and locate the kidneys and the bladder. 5.Know that kidneys remove excess water and urea. 6.Know that blood sugar levels need to be controlled. 7.Know that the body controls blood sugar levels with insulin. 8.Be able to name and locate the pancreas. 9.Know that insulin is produced by the pancreas 10.Know that diabetes can be managed by controlling sugar levels in the diet and use of insulin. 11.Know that different people have different lifestyles and therefore dietary requirements 12.Understand, in simple terms, the processes of digestion and absorption and where these events occur. 13.Know that enzymes speed up reactions in humans

	14.Understand that enzymes speed up digestion to produce smaller soluble chemicals (which can pass into the blood by diffusion). 15.Know that there are different enzymes in the mouth, stomach and intestines, each of which digests a different type of food. 16.Know that drugs can be beneficial or harmful 17.Know that a drug is a chemical that has an effect on the mind or the body. 18.Know that some drugs are addictive. 19.Know how the effect of caffeine on heart rate can be measured. 20.Know that alcohol abuse accounts for more deaths and crime than any other drug. 21.Know the short term effects of alcohol (limited to blurred vision, slurred speech, poor balance and slower reactions). 22.Know the dangers of drink driving. 23.Know the long term effects of alcohol (limited to liver damage). 24.Understand the uses of neutralisation, limited to curing indigestion and reducing the acidity of soils. 25.Know that excess acid in the stomach is a cause of indigestion. 26.Interpret simple information comparing the effectiveness of different indigestion remedies [no recall expected].
Plants	
Pre 7	1.Explore the natural world around them by recognising and naming some plants
Year 7	1.identify and name a variety of common wild and garden plants, including deciduous and evergreen trees 2. identify and describe the basic structure of a variety of common flowering plants, including trees 3. identify and describe the functions of different parts of flowering plants: roots, stem/trunk, leaves and flowers 4. 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 5. investigate the way in which water is transported within plants 6. explore the part that flowers play in the life cycle of flowering plants, including pollination, seed formation and seed dispersal 7. classify animals into commonly found invertebrates (such as insects, spiders, snails, worms) and vertebrates (fish, amphibians, reptiles, birds and mammals). 8. find out about the significance of the work of scientists such as Carl Linnaeus, a pioneer of classification.
Year 8	1. Observe and describe the changes in wild plants/flowers throughout the 4 seasons.

Year 10	1.Know that plants make their own food from carbon dioxide in the air and water. 2.Know that this process is called photosynthesis. 3.Know that plants also need light to make their own food. 4.Explain the effect of temperature, light intensity and carbon dioxide concentration on the rate of photosynthesis. 5.Know that plants make sugars and some is stored as starch. 6.Know that oxygen is a waste product of photosynthesis. 7.Explain how the structure of xylem and phloem are adapted to their functions in the plant. 8.Explain how water and mineral ions are taken up by plants, relating the structure of the root hair cells to their function. 9.Describe the processes of transpiration and translocation, including the structure and function of the stomata. 10.Explain the effect of a variety of environmental factors on the rate of water uptake by a plant, to include light intensity, air movement and temperature.
Living things and their habitat	
Pre 7	1.Know some similarities and differences between the natural world around them and contrasting environments, drawing on their experiences and what has been read in class. 2.Describe the immediate environment using knowledge from observation, discussion, stories, non-fiction texts and maps
Year 7	1. give reasons for classifying plants and animals based on specific characteristics 2. describe the differences in the life cycles of a mammal, an amphibian, an insect and a bird 3. explore and compare the differences between things that are living, dead, and things that have never been alive 4. identify that most living things 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 5. identify and name a variety of plants and animals in their habitats, including micro-habitats 6. 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 7.recognise that living things can be grouped in a variety of ways 8. explore and use classification keys to help group, identify and name a variety of living things in their local and wider environment

	9.recognise that environments can change and that this can sometimes pose dangers to living things for example, the positive effects of nature reserves, ecologically planned parks, or garden ponds, and the negative effects of population and development, litter or deforestation.
Year 9	DEAD OR ALIVE 2. Recall the life processes: movement, respiration, sensitivity, growth, reproduction, excretion, and nutrition 3. Be able to name the body systems involved with these life processes: circulatory, respiratory and digestive. 4. Be able to label the nucleus, cytoplasm and cell membrane of an animal cell. 5. Know that the nucleus controls the cell; the membrane allows some chemicals to pass in and out, and the cytoplasm is where useful chemical reactions take place. 6. Know that cells get substances in by diffusion, and active transport [No knowledge of the process is required]. 7. Know that new cells are made when cells divide. 8. Know that new body cells are needed for growth and repair. 9. Know that cancer can be caused when cell division is out of control. 10. Know that bigger organisms have cells that are adapted for different roles to include nerve cells/root hair cells/red blood cells. 11. Know that stem cells are cells that can change into other cells. 12. know that stem cells can be used in medicine to repair the body. CREEPY CRAWLIES 1. Know that animals get their food from eating plants or other animals. 2. Know that may different materials cycle through an ecosystem. 3. Explain the importance of the carbon cycle and the water cycle to living organisms. 4. Explain that microorganisms are involved in the cycling of materials through an ecosystem. 5. Understand how some animals are adapted as successful predators. 6. Understand the terms herbivore and carnivore. 7. Be able to construct a simple food chain with a plant, a herbivore and a carnivore. 8. Be able to interpret a simple food web (limited to 3 organisms at any level). 9. Understand how a change affecting one species in a food web can affect another species in the same food web. 10. Be able to describe and carry out simple sampling methods: limited to pooters, nets, pitfall traps and quadrat surveys. 11. Be able to use simple keys to name plants and animals. 12. Describe that DNA is now used to help classify organisms. 13. Know the meaning of the term habitat. 14. Understand that organisms are adapted to live in their habitat.

	15. Be able to estimate the number of plants in an area using results of a quadrat survey. 16. Describe the impact of humans on biodiversity. 17. Explain some of the reasons why scientists want to maintain biodiversity.
Earth and Space	
Year 7	1. Know that we live on a planet called Earth. 2. Know that our Earth has one moon called Luna.
Year 8	1.describe the movement of the Earth and other planets relative to the sun in the solar system 2.describe the movement of the moon relative to the Earth 3.describe the sun, Earth and moon as approximately spherical bodies 4.use the idea of the Earth's rotation to explain day and night and the apparent movement of the sun across the sky 5. Know that the Sun is a star, and that there are other stars in our galaxy. 6. Name all 8 planets in our solar system. 7. Know that Katherine Johnson is an astronaut and has made significant contributions to space travel.
Year 9	1. Know that the Sun is at the centre of our solar system. 2. Know that the Sun is a star. 3. Know that the Earth orbits the Sun. 4. Recall that the Earth moves in its orbit through space at an enormous speed. 5. Interpret information about the planets and other bodies in the Universe [no recall expected] 6. Know that space contains many stars of which the Sun is one. 7. Know that the Sun is a star in the Milky Way galaxy. Know that there are billions of stars in the Milky Way. 8. Know that there are billions of galaxies in the Universe. 9. Be able to compare the sizes of the moon, the Earth, the Sun, the Milky Way and the Universe. 10. Know that astronomers use astronomical telescopes to study the sky. 11. Know that planets and moons reflect light which enable them to be seen 12. Understand that light pollution and dust in the atmosphere interferes with observations by astronomers. 13. Know that astronomers have discovered planets around other stars.

Year 11	1. Know that the moon orbits the Earth. 2. Know the order of the eight planets in the solar system. 3. Interpret information about the planets and other bodies in the Universe [no recall expected]. 4. Know that other planets have moons. 5. Find out which other planets have moons. 6. Know that large rockets are needed to put things in space. 7. Apply Newton's first law to explain why a rocket on a launch pad remains where it is before take-off. 8. Know that Newton's second law is used by scientists to work out how the rocket lifts off the pad relating forces, masses and accelerations F = ma. 9. Explain how the thrust of the rocket is provided by heating a gas to increase its volume. 10. Explain how the motion of the molecules in a gas is related both to its temperature and its pressure: (qualitative only). 11. Explain what would happen if you had a blockage in a rocket motor. 12. Recall Newton's third law to the forces of the rocket. 13. Apply Newton's law to explain why the rocket in space keeps a constant speed. 14. Know that some parts of some rockets/shuttles return to the Earth and can be reused. 15. Understand that manned spacecraft need resources that unmanned spacecraft do note.g. oxygen, food, water. 16. Know that other (artificial) satellites orbit the Earth and are used for communication, mapping, spying and tracking.
Rocks, minerals, atoms and elements	
Year 8	1. compare and group together different kinds of rocks based on their appearance and simple physical properties 2.describe in simple terms how fossils are formed when things that have lived are trapped within rock 3. recognise that soils are made from rocks and organic matter. 4. Understand and describe the rock cycle and the formation of igneous, sedimentary and metamorphic rocks 5. Understand the basic structure of the Periodic Table 6. Identify the components of difference rocks and minerals using a periodic table.
Year 9	EVERYTHING IN ITS PLACE 1.Know the relative size of atoms and small molecules.

	2.Know that scientists' ideas of what an atom looks like (called the atomic model) has changed over time. 3.Describe the atom as a nucleus surrounded by particles called electrons. 4.Recall relative charges and approximate relative masses of protons, neutrons and electrons. 5.Explain how the position of an element in the Periodic Table is related to its atomic number (the number of protons in the nucleus) . 6.Use the names and symbols of common elements from the Periodic Table. 7.Use the names and symbols of the first 20 elements from the Periodic Table. 8.Use the names and symbols of the first Groups 1, 7 and 0 elements from the Periodic Table. 9.Recall the names of the periodic Groups [1 (alkali metals), 7 (halogens) and 0 (noble gases)]. 10.Know that the elements in Groups 1, 7 and 0 are clustered together because they all have the same number of electrons in the outer shell (Group 1 has one electron, Group 7 has seven and Group 0 has eight electrons). 11.Recognise that the atomic structure of metals and non-metals relates to their position in the Periodic Table. 12.Explain that isotopes are different forms of the same atom with a different number of neutrons. 13.Calculate numbers of protons, neutrons and electrons in atoms given their atomic number and mass (higher level learners can also do this exercise with isotopes).