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Evolve Academy

Curriculum Planning

Science

Curriculum Intent

At Evolve Academy we aim to deliver the National Curriculum aims, in the most memorable, exciting, and effective way possible, where high standards are always sought and attention is always given to motivating pupils to be lifelong learners. One of the key aspects of our curriculum is how we make creative meaningful connections between our core and foundation subjects. Our main aim is connecting the curriculum through termly themes, with a clear focus on integrating and developing key reading, writing and maths skills. We teach and encourage a growth mind set approach, where pupils learn from their mistakes enabling them to become confident, creative, independent and inquisitive learners.

We strive to provide all pupils, regardless of gender, sexual orientation, disability or race, with the best possible education, based on a broad and balanced curriculum with a clear entitlement to quality education which more than fulfils national requirements. Pupils are encouraged to learn in a way that is stimulating, fun and meets a variety of learning styles to accommodate the needs of all pupils.

At Evolve Academy we recognise the importance of science in every aspect of daily life. As one of the core subjects taught in schools, we give the teaching and learning of science the prominence it requires. Our science curriculum fosters a healthy curiosity in pupils about the world around them and promotes respect for the living and non-living which encourages pupils to be inquisitive throughout their time at the school and beyond. We believe science encompasses the acquisition of knowledge, concepts, skills and positive attitudes. Throughout the programmes of study, our pupils will acquire and develop the key knowledge that has been identified within each topic, as well as the application of scientific skills enabling them to develop a sense of excitement and curiosity about natural phenomena. We ensure that the 'working scientifically skills' are built-on and developed throughout pupils time at the school so that they can apply their knowledge of science when using equipment, conducting experiments, building arguments and explaining concepts confidently and continue to ask questions and be curious about their surroundings. They are encouraged to understand how science can be used to explain what is occurring, predict how things will behave, and analyse causes. Evolve Academy ensures that all pupils are exposed to high quality teaching and learning experiences, which allow pupils to explore their outdoor environment and locality, developing their scientific enquiry and investigative skills. They are immersed in scientific vocabulary, which aids pupil's knowledge and understanding not only of the topic they are studying, but of the world around them.

Curriculum Implementation

In ensuring high standards of teaching and learning in science, at Evolve Academy we implement a curriculum that is progressive throughout the whole school. Planning for science is a process in which the school gives full coverage of 'The National Curriculum programmes of study for Science. Science is taught consistently, three lessons per week, but is discretely taught in many different contexts throughout all areas of the curriculum. A positive attitude to science is embedded in learning and within the classroom to reinforce an expectation that all pupils are capable of achieving high standards in science. Our whole school approach to the teaching and learning of science involves the following:

- Science will be taught in planned and arranged topic blocks by the class teacher. This is a strategy to enable the achievement of a greater depth of knowledge.
- Through planning, problem solving opportunities allow pupils to find out for themselves. Pupils are encouraged to ask their own questions and be given opportunities to use their scientific skills and research to discover the answers. This curiosity is celebrated within the classroom. Planning involves teachers creating engaging lessons, often involving high-quality resources to aid understanding of conceptual knowledge. Teachers use precise questioning in class to test conceptual knowledge and skills and assess pupils regularly to identify those pupils with gaps in learning, so that all pupils keep up.
- We build upon the learning and skill development of the previous years. As the pupils knowledge and understanding increases, and they become more proficient in selecting, using scientific equipment, collating and interpreting results, they become increasingly confident in their growing ability to come to conclusions based on real evidence.
- Working scientifically skills are embedded into lessons to ensure these skills are being developed throughout the pupils school career and new vocabulary and challenging concepts are introduced through direct teaching. This is developed through the years, in-keeping with the topics.
- Teachers demonstrate how to use scientific equipment, and the various working scientifically skills in order to embed scientific understanding. Teachers find opportunities to develop pupils understanding of their surroundings by accessing outdoor learning.

We ensure that all pupils are provided with rich learning experiences that aim to:

- Prepare our pupils for life in an increasingly scientific and technological world today and in the future.
- Help our pupils acquire a growing understanding of the nature, processes and methods of scientific ideas.
- Help develop and extend our pupils scientific concept of their world.
- Build on pupil's natural curiosity and developing a scientific approach to problems.

- Encouraging open-mindedness, self-assessment, perseverance and developing the investigation skills – including: observing, measuring, predicting, hypothesising, experimenting, communicating, interpreting, explaining and evaluating.
- Develop the use of scientific language, recording and techniques.
- Make links between science and other subjects.

Curriculum Impact

The successful approach at Evolve Academy results in a fun, engaging, high-quality science education, that provides pupils with the foundations for understanding the world. Our engagement with the local environment ensures that pupils learn through varied and first-hand experiences of the world around them. So much of science lends itself to outdoor learning and so we provide pupils with opportunities to experience this. Our science curriculum is high quality, well thought out and is planned to demonstrate progression. If pupils are keeping up with the curriculum, they are deemed to be making good or better progress. The impact and measure of this is to ensure pupils not only acquire the appropriate age-related knowledge linked to the science curriculum, but also skills which equip them to progress from their starting points, and within their everyday lives. All pupils will have:

- A wider variety of skills linked to both scientific knowledge and understanding, and scientific enquiry/investigative skills.
- A richer vocabulary which will enable to articulate their understanding of taught concepts.
- High aspirations, which will see them through to further study, work and a successful adult life.

Assessment in Science:

Recall/Recap	**Mapping**	**Peer-assessment**	**Baseline Assessments**
Questioning	**Portfolio**	**Self-assessment**	**End of Unit Assessments**
Instant Feedback	**Quizzes**	**Teacher Marking**	**On-going Assessment**
Knowledge checks	**Tests**	**Live Marking**	**Data Capture**
Observation	**Learning Partners**	**Improving Answers**	**Target Setting**
Discussion	**Think, Pair, Share**		**Self/Peer Assessment**
WAGOLL	**Thumbs Up/Down**		
Photographic Evidence	**Big 5**		

Overview National Curriculum KS1, KS2 & 3

	Autumn 1	Autumn 2	Spring 1	Spring 2	Summer 1	Summer 2
Key Stage 1 (Year 1 and 2)	Changing Materials	Mixing and Making	Human Anatomy	Habitats	Seasons and Change/Space	Sound
Key Stage 2 Lower (Year 3 and 4)	How Science Works	Separating Mixtures	Plants	Adaptations	Electrical Circuits	Light
Key Stage 2 Upper (Year 5 and 6)	How Science Works	Separating Mixtures	Plants	Adaptations	Electrical Circuits	Light
Key Stage 3 (Year 7)	Cells, Tissues and Organs	Atoms and The Periodic Table	Biological Systems and Processes	Reproduction and Variation	Light and Space	Electricity and Magnetism

Key Stage 3 (Year 8)	Cells, Tissues and Organs	Atoms and The Periodic Table	Biological Systems and Processes	Reproduction and Variation	Light and Space	Electricity and Magnetism
Key Stage 3 (Year 9)	Cells, Tissues and Organs	Atoms and The Periodic Table	Biological Systems and Processes	Reproduction and Variation	Light and Space	Electricity and Magnetism

Key Stage 1 Curriculum Year 1

Autumn 1	Knowledge	Skills
Changing Materials	Pupils should explore, name, discuss and raise and answer questions about everyday materials so that they become familiar with the names of materials and properties such as: hard/soft; stretchy/stiff; shiny/dull; rough/smooth; bendy/not bendy; waterproof/not waterproof; absorbent/not absorbent; opaque/transparent.	1. Identifying different materials: wood, wool, plastic, glass, metal & paper. 2. Identifying the materials used to make different objects. 3. Using different properties of materials to describe them e.g. hard, soft, rough, smooth, shiny, heavy and/or transparent. 4. Predicting whether materials will float or sink based on how heavy they are. 5. Testing whether different materials float or sink. 6. Testing whether materials are absorbent or waterproof. 7. Choosing the best material based on properties for different uses.

	Pupils should be able to 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 **Pupils should explore and experiment, with a wide variety of materials, such as bricks, paper, fabrics, elastic and foil.** **Pupils should be able to describe the simple physical properties of a variety of everyday materials and compare and group together a variety of everyday materials on the basis of their simple physical properties.**	

Key Stage 1 Curriculum Year 2

Autumn 1	Knowledge	Skills

Changing Materials	**Pupils must identify and compare the suitability of a variety of everyday materials, including wood, metal, plastic, glass, brick, rock, paper and cardboard for particular uses.** **Pupils must find out how the shapes of solid objects made from some materials can be changed by squashing, bending, twisting and stretching.**	1. **Name common materials and their properties.** 2. **Matching materials to uses based on their properties.** 3. **Examples of solid objects.** 4. **Squashing, bending, twisting and stretching.** 5. **Testing different materials.** 6. **Testing the elasticity of different fabrics.** 7. **Testing whether a variety of materials used are absorbent.** 8. **Give examples of raw vs synthetic materials (Natural vs man made).** 9. **Sorting materials based on their properties.** 10. **Comparing the properties of raw vs synthetic materials.**

Key Stage 1 Curriculum Year 1

Autumn 2	Knowledge	Skills

Mixing and Making	**Pupils should be able to distinguish between an object and the material from which it is made.** **They must identify and name a variety of everyday materials, including wood, plastic, glass, metal, water, and rock.** **Pupils should be able to describe the simple physical properties of a variety of everyday materials.**	1. **Deciding the best material to build with based on waterproofness.** 2. **Designing a waterproof wall.** 3. **Planning an experiment to test waterproofness.** 4. **Building a wall and testing the waterproofness.** 5. **Designing a strong wall.** 6. **Planning an experiment to test ability to withstand strong wind.** 7. **Building a wall and testing the strength.** 8. **Learning about combining/mixing materials to make stronger materials.**

Key Stage 1 Curriculum Year 2

Autumn 2	Knowledge	Skills
Mixing and Making	Pupils must identify and compare the suitability of a variety of everyday materials, including wood, metal, plastic, glass, brick, rock, paper and cardboard for particular uses. Pupils must find out how the shapes of solid objects made from some materials can be changed by squashing, bending, twisting and stretching.	1. Name common materials and their properties. 2. Matching materials to uses based on their properties. 3. Examples of solid objects. 4. Squashing, bending, twisting and stretching. 5. Testing different materials. 6. Testing the elasticity of different fabrics. 7. Testing whether a variety of materials used are absorbent. 8. Give examples of raw vs synthetic materials (Natural vs man made). 9. Sorting materials based on their properties. 10. Comparing the properties of raw vs synthetic materials.

Key Stage 1 Curriculum Year 1

Spring 1	Knowledge	Skills

Human Anatomy	**Identify the different types of teeth in humans which are the incisors, canines and molars and their simple functions which is to chew and break down food.**	**1. Compare the teeth of different animals.** **2. Identify the types of human teeth.** **3. Describe the function of different types of teeth.**

Key Stage 1 Curriculum Year 2

Spring 1	Knowledge	Skills
Human Anatomy	**Identify that humans and some other animals have skeletons and muscles for support, protection and movement.** **Describe the simple functions of the basic parts of the digestive system in humans. Pupils will be able to explain that the digestive system helps to break down the food for the body to process and use. It is a series of organs that break down the food so it can be absorbed into our blood and travel around where it is needed, and gets rid of all the body's waste as well.** **Pupils can explain that the circulatory system (cardiovascular**	**1. Label major organs in human body.** **2. Describe the functions of the major human organs.** **3. Explain why organ donation is so important.** **4. Label the human skeleton.** **5. Describe the functions of the skeleton.** **6. Describe the difference between an endoskeleton and an exoskeleton.** **7. Describe variation within the animal kingdom.** **8. Compare the human skeleton to other animals.** **9. Compare human organs to other animals.** **10. Give the components of the circulatory system.**

	system) is responsible for the transport of substances - nutrients, oxygen, carbon dioxide, and cellular waste material - throughout the entire body. The primary function of the circulatory system is to transport substances throughout the body via the blood pumped by the heart that flows into the blood vessels.	11. Describe how the circulatory system works and label the major components of the digestive system. 12. Describe the function of the different parts of the digestive system. 13. Describe the journey food takes through our digestive system.

Key Stage 1 Curriculum Year 1

Spring 2	Knowledge	Skills
Habitats	Pupils should find out about and describe the basic needs of animals, including humans, for survival (water, food and air). Pupils should be able to identify and name a variety of common animals including fish, amphibians, reptiles, birds and mammals. Pupils can name a variety of common animals that are carnivores, herbivores and omnivores within a habitat and give examples of each.	1. Features of a living thing. 2. What animals need to survive. 3. Know the differences between invertebrate and vertebrates. 4. Describe the characteristics of arachnids, insects and crustaceans and their habitats. 5. Describe the characteristics of amphibians and their habitats. 6. Describe the characteristics of reptiles and their habitats. 7. Describe the characteristics of mammals and their habitats. 8. Describe the characteristics of birds and their habitats. 9. Know what carnivores, omnivores and herbivores are.

Key Stage 1 Curriculum Year 2

Spring 2	Knowledge	Skills
Habitats	**Pupils can explore and compare the differences between things that are living, dead, and things that have never been alive.** **Pupils can 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.** **Pupils can identify and name a variety of plants and animals in their habitats, including microhabitats.** **Pupils can describe how animals obtain their food from plants and other**	**1. Identifying living and non-living things.** **2. Indicators of living things.** **3. What organisms need to survive.** **4. Defining a habitat.** **5. Drawing simple food chains.** **6. What are the features of woodland habitats.** **7. What are microhabitats in woodlands.** **8. Features of desert habitats.** **9. Examples of desert animals.** **10. Examples of desert plants.** **11. Features of rainforest habitats.** **12. Examples of rainforest animals.** **13. Examples of rainforest plants.** **14. Features of urban environments.** **15. Examples of urban animals.** **16. Importance of green spaces in urban environments.**

	animals, using the idea of a simple food chain, and identify and name different sources of food.	

Key Stage 1 Curriculum Year 1

Summer 1	Knowledge	Skills
Seasons and Change/Space	Pupils should observe and talk about changes in the weather and the seasons. Pupils should be able to give a definition about what they think the weather is. Weather is sunshine, rain, snow, wind, and storms. It's what is going on outside right now. Pupils should know the weather is different at different places around the planet and in some places it is sunny right now, while in other places it is snowing. Many things affect the weather including the atmosphere, the Sun, and the season. Pupils can explain what Space is and describe what is consists of	1. Naming different types of weather. 2. Identifying the 4 seasons based on weather. 3. Starting a weather log during the week. 4. Describing the weather in each season. 5. Describe the different temperatures in each season and how it changes. 6. Defining space. 7. How we learn about space. 8. Things found in space: planets, sun, moon, stars. 9. Order of planets in solar system. 10. Features of the planets in the solar system. 11. Why do we have seasons and day and night?

	paying attention to the solar system. Pupils can name the planets in the Solar System in order. Pupils can explain how does the Earth orbit and rotate. Pupils know that the Earth rotates in front of the Sun on an imaginary line called its axis. It takes 24 hours or one day to make a rotation. When parts of the Earth face the Sun, it's daytime. When they are in the shade, it's night time.	

Key Stage 1 Curriculum Year 2

Summer 1	Knowledge	Skills
Seasons and Change/Space	Pupils will observe and describe weather associated with the seasons. They will look at the different seasons and discuss how they are different from one another. Pupils will know how the weather changes across the seasons by	1. Linking the months of the year to each season. 2. Describe the appearance of trees. 3. What will trees look like during different events? e.g. Father's Day or Halloween. 4. Defining a liquid. 5. Making a rain gauge. 6. Defining hibernation.

	examining the Earths tilt and where it is in its orbit around the Sun. **How do trees change across the seasons. Pupils need to look at temperature, sunlight, pollution and weather which can all affect how trees change.** **What instruments could pupils use to measure rainfall. Pupils can discuss how scientists use instruments to measure weather such as thermometers, rain gauges, barometers and anemometers. Pupils will describe why animals hibernate. Pupils can explain hibernation is when animals find a safe, dry place and sleep through the winter. Before they sleep, they spend many days eating as much as they can. They then store all this food in their bodies as fat, which keeps them alive through the winter.** **Pupils can experiment how wind direction is recorded by using a compass and a cup anemometers.** **Pupils can explain what constellations are. Pupils can explain that a constellation is an area on the celestial sphere in which a group of visible stars forms a perceived pattern or outline, typically representing an animal,**	7. **Give examples of animals that hibernate.** 8. **Explain why animals hibernate.** 9. **Describe where animals hibernate.** 10. **Ordering types of wind by strength.** 11. **Using a scale to record wind strength.** 12. **Examples of stars and famous constellations.** 13. **Drawing constellations.** 14. **History of space discovery.** 15. **Examples of famous astronauts.** 16. **Examples of jobs related to exploring space.**

	mythological subject, or inanimate object. Pupils can research how and when space was discovered. Pupils can give names of scientists that have studied space such as Isaac Newton, Stephen Hawkins, Edwin Hubble or Galileo Galilei and produce a poster based on their findings.	

Key Stage 1 Curriculum Year 1

Summer 2	Knowledge	Skills
Sound	Pupils know that the 5 sensory organs are the eyes, ears, nose, tongue, and skin. Pupils can identify, name, draw and label the basic parts of the human body and say which part of the body is associated with each sense, mainly hearing.	1. Describe the body part associated with each sense. 2. Explain how we hear. 3. Outline the auditory range of humans and animals. 4. Explain the causes of deafness. 5. Give examples of sign language. 6. The different zones of the ear. 7. How to look after each zone e.g. cleaning, protecting from loud volumes.

Key Stage 1 Curriculum Year 2

Summer 2	Knowledge	Skills
Sound	**Pupils can outline how sound waves are produced by vibrations of objects. When the object vibrates it produces sound waves and these waves travel through the medium. If there is no medium, then the sound waves won't propagate and sound waves will not reach us** **Describe how sound waves need a medium (solid, liquid or gas) to travel. A medium is made up of particles all of which carry the sound waves.**	**1. Recording the sounds you can hear.** **2. What is the definition of sound.** **3. Ordering sounds from quietest to loudest.** **4. Explain how we hear.** **5. Difference between high and low pitch sounds.** **6. Identifying high and low pitched sounds.** **7. Describing sounds based on volume and pitch.** **8. Grouping sounds based on volume and pitch.** **9. Give a definition for amplitude, wavelength, frequency, relating to**

		velocity and frequency, relating to wavelength.

Key Stage 2 Curriculum Year 3

Autumn 1	Knowledge	Skills
How Science Works	Pupils should understand that in order to reduce the risk of harm in the lab, it's important to take precautions. These precautions are often given as a set of general lab rules to follow. Lab rules are put in place to keep everyone as safe as possible. Pupils know that hazard symbols warn about the dangers of a substance and the harm it can cause. Pupils must plan for hazards and risks by thinking about what precautions to take in certain situations. Pupils can easily identify a hazard/risk and consider what precautions can be taken to reduce the hazard/risk.	1. Pupils know that when working in a laboratory, they must follow the lab rules. 2. Describe the hazard symbols which give information about chemicals and materials. 3. When working in a lab, take safety precaution in situations that can cause harm. 4. Explain the risks that could be taken to reduce the harm.

Key Stage 2 Curriculum Year 4

Autumn 1	Knowledge	Skills
How Science Works	**Pupils know that equipment used in science is often called apparatus. Diagrams of apparatus being used are usually drawn instead of pictures.** **Pupils should demonstrate how cross-section diagrams are used in science to help make scientific diagrams of apparatus clear and easy to understand what they show. Individual diagrams of equipment can be combined to show a practical technique.** **Pupils can show that a hypothesis is developed from an idea or question that is based on an observation. A prediction is then made, an experiment carried out to test this, then the results are analysed and conclusions can be drawn.** **Pupils know that a variable is anything that can be changed and measured in an experiment.**	**1. Pupils can use diagrams to show how scientific apparatus is set up.** **2. Pupils must be able to read measuring instruments properly.** **3. Pupils can use common practical techniques that use apparatus include filtration, evaporation and distillation.** **4. Pupils can read the numbers accurately from a scale and record them in a suitable table.** **5. Pupils can write a hypothesis which is an idea about how something works that can be tested using experiments.** **6. Pupils can identify a good method.** **7. Pupils can follow the instructions in a method.** **8. Pupils can write a method for an investigation.** **9. Pupils can describe what a prediction says what will happen in an experiment if the hypothesis is correct.** **10. Pupils can write a hypothesis and prediction for a experiment and carry it out to see the results.**

	Independent variables – the variable that is being changed during the experiment. Dependent variables – the variable being tested or measured during the experiment. Control variable – the variables that is kept the same throughout the experiment.	11. Pupils can define a dependent, independent and control variable.

Key Stage 2 Curriculum Year 5

Autumn 1	Knowledge	Skills
How Science Works	Pupils know that a method describes how an experiment is carried out. It should contain a set of written instructions with numbers or letters to show the order in which the steps are carried out. Pupils can demonstrate that a diagram can be included to show how the experiment should look when it's set up. Each step should describe one action during the experiment. The apparatus used should be described, using scientific	1. Pupils can develop a method that is an important part of planning an investigation. 2. Pupils can identify a good method. 3. Pupils can follow the instructions in a method. 4. Pupils can write a method for an investigation. 5. In an experiment, pupils know how to evaluate the validity of the steps leading up to the conclusion for it to be valid. 6. Pupils can take measurements and collect results in an experiment which is called data. Pupils know it is

	terms. Everything that was done to complete the whole experiment should be listed in the method, so somebody else could follow it and get a similar outcome. Pupils know to draw appropriate tables to record their results obtained in the experiment. The table should include appropriate headings that indicate the results/variables collected and how to present these results.	important to collect data that is accurate and precise and know how to do this. 7. Pupils know to collect the data again to get valid results. 8. Pupils can describe how to collect results. 9. Pupils can draw a results table.

Key Stage 2 Curriculum Year 6

Autumn 1	Knowledge	Skills
How Science Works	Pupils know that after a scientific method has been followed through, data is analysed to see if it matches the prediction and check if the hypothesis seems correct. Pupils know that once data has been collected, displaying it in a chart or a graph helps to spot patterns. The pattern, if there is one, will show how the independent	1. Pupils know how to present results, this can be displayed in a chart or a graph. 2. Pupils know how to interpret results. 3. Pupils can write a conclusion using the results collected. 4. Pupils can sum up a conclusion that has been found out during an investigation.

	variable has affected the dependent variable. Pupils can analyse the data and draw a conclusion that indicates what has been found out during an investigation. A good conclusion should fully describes the relationship between variables. Link the findings back to the hypothesis and explain findings using scientific knowledge and understanding. Pupils know that at the end of an investigation, it is important to evaluate the results and the method. After this is done, a judgement is made about how reliable the conclusion is. Improvements to the method should be suggested and then, an explanation as to how this would lead to data of a better quality.	5. Pupils can clearly structure and explain a conclusion using scientific knowledge. 6. Pupils can evaluate the results and method to judge how reliable the conclusion is at the end of an experiment/investigation.

Key Stage 2 Curriculum Year 3

Autumn 2	Knowledge	Skills

Separating Mixtures	**Know that some materials will dissolve in liquid to form a solution, and describe how to recover a substance from a solution.** **Pupils know that a pure substance only contains one type of atom.** **Explain what makes something a mixture? Pupils will find that you can still separate if something is a mixture due to the substances are not chemically bound.**	1. **Define a pure substance.** 2. **Give examples of pure substances.** 3. **Explain how we can tell if something is pure or not.** 4. **Know what a mixture is.**

Key Stage 2 Curriculum Year 4

Autumn 2	Knowledge	Skills
Separating Mixtures	**Know that some materials will dissolve in liquid to form a solution, and describe how to recover a substance from a solution.** **Pupils can use knowledge of solids, liquids and gases to decide how**	1. **Give examples of mixtures of substances from the same state of matter.** 2. **Give examples of mixtures of substances from different states of matter.** 3. **Describe how to remove large solids from a mixture.**

	mixtures might be separated, including through filtering, sieving and evaporating. Pupils can conduct these experiments and record their finding.	4. Describe how to remove insoluble substances from a mixture. 5. Describe how to remove soluble substances from a mixture. 6. Define 'solution', 'solute', 'solvent', 'soluble' and 'insoluble'.

Key Stage 2 Curriculum Year 5

Autumn 2	Knowledge	Skills
Separating Mixtures	Pupils can explain how we can separate mixtures into pure substances by looking at methods such as distillation and conducting this experiment. Pupils can describe how you separate a mixture of sand, salt and water by looking at methods such as filtering and conducting this experiment.	1. Describe how to use filtration to separate some mixtures. 2. Describe how you can use evaporation to separate some mixtures.

Key Stage 2 Curriculum Year 6

Autumn 2	Knowledge	Skills
Separating Mixtures	**Pupils should know that a formulation is a mixture that has been designed to do something useful. It is formed by mixing together several different substances in carefully measured quantities to ensure the product has the required properties.** **Describe how we can separate river water into separate substances. Pupils can research different separation methods.**	**1. Describe what a formulation is and give examples.** **2. Explain why formulations are useful.** **3. Separate substances in river water.** **4. Evaluate the method for separating substances in river water.** **5. Suggest how an environmental scientist could check the water quality in a river.**

Key Stage 2 Curriculum Year 3

Spring 1	Knowledge	Skills

Plants	**Pupils must know how to plant a bean.** **Pupils know what types of plants grow in the wild and identify some.** **Pupils should be able to 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.**	1. **Planting a bean and setting up an investigation into what plants need to survive.** 2. **Identifying wildflowers.** 3. **Understanding the importance of wildflowers.** 4. **Differences between deciduous and evergreen trees.** 5. **Identifying common trees from their leaves.** 6. **Know the parts of a tree: trunk, leaves, fruit, branches, roots.** 7. **Know parts of a flowering plant: seeds, flower, buds, leaves, stem and roots.**

Key Stage 2 Curriculum Year 4

Spring 1	Knowledge	Skills
Plants	**Pupils can explain what changes occur to a tomato plant.** **Pupils can observe and describe how seeds and bulbs grow into mature plants and find out and describe how plants need water, light and a suitable temperature to grow and stay healthy.**	1. **Describe the stages of growth in tomato plants.** 2. **How to plant tomato seeds.** 3. **Recording changes to the bean plant including drawing a diagram and measuring with a ruler.**

	Pupils can describe what changes have occurred to a bean plant and record these changes.	

Key Stage 2 Curriculum Year 5

Spring 1	Knowledge	Skills
Plants	Pupils can identify and describe the functions of different parts of flowering plants: roots, stem/trunk, leaves and flowers. Pupils can 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.	1. Name the 3 main types of variables needed for plants to grow. 2. What a plant needs to survive. 3. How to plan an investigation into the factors that affect plant growth. 4. The main parts and functions of a plant. 5. How to draw a scientific diagram. 6. Describe the main parts of a flower. 7. The functions of each of the main parts of a flower. 8. How to identify the parts on a real flower. 9. The parts of a flowering plant's life cycle.

Key Stage 2 Curriculum Year 6

Spring 1	Knowledge	Skills
Plants	**Pupils can explain and investigate the way in which water is transported within plants.** **How does a plant transport water? Pupils will know plants require transport systems to move water, dissolved food and other substances around their structures in order to stay alive.** **Plants require water for two major reasons, for photosynthesis. In most flowering plants this happens in mesophyll cells in the leaves and to transport materials, eg minerals. Water taken up by the roots of a plant is transported through a plant to the leaves where some of it passes into the air.** **Explore the part that flowers play in the life cycle of flowering plants, including pollination, seed formation and seed dispersal.** **Pupils can explain how plants adapt to different environments.**	1. **How to draw a scientific diagram.** 2. **How to write a conclusion for an investigation.** 3. **The parts of a flowering plant's life cycle.** 4. **The conditions required for germination.** 5. **Three ways in which seed dispersal takes place.** 6. **Describe what transpiration is.** 7. **The three main steps of water transport in plants.** 8. **How to prove that water moves up a plants stem.** 9. **What a plant adaptation is.** 10. **How plants adapt to extreme hot and cold.** 11. **How plants adapt to attract animals or keep them away.**

Key Stage 2 Curriculum Year 3

Spring 2	Knowledge	Skills
Adaptations	Pupils can identify how animals and plants are adapted to suit their environment in different ways and that adaptation. Plants and animals have features and characteristics that allow them to adapt to hot environments. Plants and animals have features and characteristics that allow them to adapt to cold environments.	1. Define an adaptation. 2. Understand that adaptations are not a 'choice'. 3. Learn a range of common adaptations e.g. camouflage. 4. Describe the conditions of hot and dry environments. 5. Adaptations of desert animals. 6. Adaptations of desert plants. 7. Describe the conditions of cold environments. 8. Common adaptations of animals to cold environments e.g. insulation. 9. Make comparisons between organisms from different cold environments.

Key Stage 2 Curriculum Year 4

Spring 2	Knowledge	Skills
Adaptations	**Pupils must be able to explain what nocturnal animals are; why they are active at night and how they are adapted to see at night.** **Pupils can name other features and characteristics of nocturnal and diurnal animals.** **Pupils can explain that nocturnal and diurnal animals see things because light travels from light sources to their eyes or from light sources to objects and then to their eyes.**	**1. Describe the conditions of night time environments.** **2. Compare the eyes of nocturnal and diurnal animals.**

Key Stage 2 Curriculum Year 5

Spring 2	Knowledge	Skills
Adaptations	**Pupils must understand nature's own sonar system; echolocation occurs when an animal emits a sound wave that bounces off an**	**1. Understand and explain how echolocation works.** **2. Give examples of various species that echolocate, explaining how.**

	object, returning an echo that provides information about the object's distance and size. Over a thousand species echolocate, including most bats, all toothed whales, and small mammals.	

Key Stage 2 Curriculum Year 6

Spring 2	Knowledge	Skills
Adaptations	Pupils can explain that organisms have features and characteristics that allow them to live and adapt to underwater environments. Pupils can describe the deep-sea environment and how organisms are adapted to live there. Pupils need to have an understanding of the deep-sea	1. Describe the conditions of underwater environments. 2. Name common adaptations of fish. 3. Name common adaptations of marine mammals. 4. Describe the conditions of deep-sea environments. 5. Name common deep-sea adaptations. 6. Explain what is meant by deep sea conservation.

	conservation where ecosystems are protected and preserved in oceans and seas through planned management in order to prevent the over-exploitation of these marine resources.	7. Research ways to protect the oceans and seas, some examples given should include the following; use less water so excess runoff and wastewater will not flow into the ocean; reduce pollutants; reduce waste; reduce vehicle pollution; fish responsibly and practice safe boating.

Key Stage 2 Curriculum Year 3

Summer 1	Knowledge	Skills
Electrical Circuits	Pupils must understand that static electricity is the result of an imbalance between negative and positive charges in an object. These charges can build up on the surface of an object until they find a way to be released or discharged. One way to discharge them is through a circuit. Pupils can see how the Van de Graaf generator creates a build-up of static electricity around a metal sphere. Electric charge in the form of electrons builds until the voltage is so high that air molecules can be	1. Describe what static charge is. 2. Describe how to create a build-up of static charge. 3. How a build-up of charge can lead to sparks through the air. 4. Understanding how the Van de Graaf generates static electricity.

	ionized and a spark discharge can take place to a nearby object. Pupils can take part in this activity or watch a video to demonstrate this.	

Key Stage 2 Curriculum Year 4

Summer 1	Knowledge	Skills
Electrical Circuits	Pupils can identify common appliances that run on electricity in the home and make a list of these appliances. Pupils can use recognised symbols when representing components in a circuit. Pupils know how to draw a simple circuit diagram using symbols to represent the components in a circuit.	1. Pupils can list of appliances that run on electricity in the home and explain where the electricity comes from. 2. Explain how electricity in a circuit is different to static electricity. 3. Name the components used in an electrical circuit. 4. Use symbols to recognise the different components in a circuit. 5. Use symbols to draw simple circuit diagrams.

Key Stage 2 Curriculum Year 5

Summer 1	Knowledge	Skills
Electrical Circuits	**Pupils can construct a simple series electrical circuit, identifying and naming its basic parts, including cells, wires, bulbs, switches and buzzers.** **Pupils will have an idea as to what they think insulators and conductors are.** **Pupils will be able to recognise that conductors are those substances through which electricity can flow are called conductors. Insulators are those substances through which electricity cannot flow are called insulators. Some common conductors are copper, aluminium, gold, and silver. Some common insulators are glass, plastic, rubber, and wood.**	**1. Explain what a circuit diagram is and state the symbols for different components used to construct a circuit.** **2. State the conditions for electricity to flow in a circuit.** **3. Build a basic circuit based on a circuit diagram.** **4. Describe what electrical insulators and conductors are and give examples.** **5. Describe how to test whether a material is an insulator or a conductor.**

Key Stage 2 Curriculum Year 6

Summer 1	Knowledge	Skills
Electrical Circuits	**Pupils can identify the changes that take place if components such as bulbs and cells are added/removed in a circuit.** **Pupils can associate the brightness of a lamp 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.**	1. **Pupils can write a prediction for what will happen when we change the components in a circuit.** 2. **Pupils can carry out an investigation to test their prediction.** 3. **Pupils will be able to record their results in an appropriate table.** 4. **Pupils can evaluate if their prediction was correct.** 5. **Create a circuit with a buzzer that can be turned on and off.**

Key Stage 2 Curriculum Year 3

Summer 2	Knowledge	Skills
Light	**Pupils can explain the difference between light and dark.** **Pupils can explain that light is what helps us see things. It can come from different places, like the Sun,**	1. **Define light and dark.** 2. **Identify different light sources.** 3. **Recognise the difference between luminous and non-luminous objects.** 4. **Describe how we see objects.** 5. **State that Earth rotates on an axis.**

	or fire, or from electricity in lamps and torches. Darkness is when there is no light. It makes it very difficult to see objects. Pupils know the difference between luminous and non-luminous objects. Recognise the sun provides sunlight which allows us to see day and night. Pupils know that light is reflected from surfaces. Pupils can identify that some materials are reflective and some materials are non-reflective. When light from an object is reflected by a surface, it changes direction. It bounces off the surface at the same angle as it hits it. Smooth, shiny surfaces such as mirrors and polished metals reflect light well. Dull and dark surfaces such as dark fabrics do not reflect light well.	6. How the spin of the Earth creates night and day. 7. Light is reflected from surfaces and enters our eyes. 8. Differences between reflective and non-reflective materials. 9. Sorting reflective and non-reflective materials.

Key Stage 2 Curriculum Year 4

Summer 2	Knowledge	Skills
Light	**Pupils can recognise the differences between transparent, translucent and opaque objects.** **Pupils know that items or objects are classified by the way they interact with light. Materials that allow all light to pass through are called transparent. Materials that allow some light to pass through are called translucent and items that don't allow any light to pass through are called opaque. Examples of opaque materials are wood, stone and metal.** **Pupils understand that shadows are formed when the light from a light source is blocked by an opaque object.** **Pupils can find patterns in the way that the size of shadows change. Pupils can change the size of a shadow by moving your body or the object closer to or farther from the light.**	1. **Compare transparent, translucent and opaque objects.** 2. **Test transparent, translucent and opaque materials.** 3. **Record findings/results in a suitable table.** 4. **How to make shadows.** 5. **Making a shadow puppet theatre.** 6. **Exploring how to change the size of a shadow by moving it further from/closer to the light source.**

Key Stage 2 Curriculum Year 5

Summer 2	Knowledge	Skills
Light	**Use the idea that light travels in straight lines to explain that objects are seen because they give 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.** **The law of reflection is a principle that states that when a ray of light hits a surface, it will bounce off at the same angle as it hit the surface, therefore, the angle of incidence is the same as the angle of reflection.** **Refraction is the change in direction of a wave, caused by the change in the wave's speed. Examples of waves include sound waves and light waves. Refraction is seen most often when a wave passes from one medium to a different medium.** **Pupils can explain how we see light with the human eye. This is a sensory organ, part of the sensory nervous system that reacts to**	1. **What happens to light when it is reflected.** 2. **State the Law of Reflection.** 3. **Describe different types of reflection.** 4. **What happens to light when it refracts.** 5. **Identify whether reflection or refraction has taken place.** 6. **Name the parts of the eye.** 7. **Explain how the human eye uses visual information to see things.** 8. **Describe how the lenses in glasses work.**

	visible light and allows humans to use visual information to seeing things.	

Key Stage 2 Curriculum Year 6

Summer 2	Knowledge	Skills
Light	White light from the Sun is a mixture of colours, each with a different frequency. A prism is used to split (or disperse) white light into a spectrum of colours: red, orange, yellow, green, blue, indigo and violet. Dispersed means that the colours are separated out. The colour of an object is determined by the wavelength of light that it reflects. We see higher frequencies of light as blue or violet, lower frequencies of light are seen as red and orange. Green light is in the middle. There are three primary colours: red, green and blue. They can be combined in different ways to make every other colour.	1. How white light is split into different colours using a prism. 2. Primary and secondary colours of light. 3. How a rainbow is made.

Key Stage 3 Curriculum Year 7

Autumn 1	Knowledge	Skills
Cells, Tissues and Organs	Pupils know that every organism, or living thing, is made up of structures called cells. The cell is the smallest unit with the basic properties of life and the building blocks for all organisms. Pupils can use a microscopes to see objects that are too small to be seen with the naked eye. Such objects include cells where pupils can interpret and record cell structure using a light microscope. Pupils can demonstrate they can use a microscope correctly and know the different parts of a microscope. Pupils can calculate the magnification of a compound light microscope which makes it possible to study tiny living things such as bacteria, algae, protozoans, and many types of cells. Pupils know the differences between animal and plant cells. Pupils know the functions of the cell wall, cell membrane, cytoplasm,	1. Label the parts of a microscope. 2. Describe how to use a microscope, using key terms correctly. 3. Calculate magnification of a specimen under a microscope. 4. Describe the differences between animal and plant cells. 5. Explain the hierarchical organisation of organisms: from cells to tissues to organs to systems to organisms. 6. List the different organ systems and explain their function. 7. Carry out a practical to make cheek cell slides and onion cell slides and to look at the structures inside these cells.

	nucleus, vacuole, mitochondria and chloroplasts. Pupils can discuss the similarities and differences between animal and plant cells. Pupils know that multicellular organisms are organized into levels that become increasingly complex, from cells at the most basic level, to tissues, organs, organ systems, and the whole organism itself.	

Key Stage 3 Curriculum Year 8

Autumn 1	Knowledge	Skills
Cells, Tissues and Organs	Pupils can explain how specialised cells are adapted to their function. Many cells in multicellular organisms are specialised. They have specific roles in the organism of which they are part. Their structure is adapted to their function. They are often grouped together with other similar cells in tissues.	1. Describe features of specialised animal and plant cells, using key structures. 2. Explain how the specialised features enable the cell to carry out its function.

	Pupils can describe how specialised cells such as, for example, red blood cells, white blood cells, sperm cells, ciliated epithelial cells and root hair cells are adapted and what features they have.	

Key Stage 3 Curriculum Year 9

Autumn 1	Knowledge	Skills
Cells, Tissues and Organs	Pupils can explain the role of diffusion in the movement of materials in and between cells. Diffusion is the movement of particles from a region where they are in high concentration to a region where they are in low concentration, and is one of the ways substances can move across the cell membrane, into or out of the cell. Particles diffuse down a	1. Define diffusion. 2. Explain factors that affect diffusion. 3. Explain examples of diffusion in the body. 4. Identify variables to change, measure and control to investigate diffusion. 5. Work safely to collect and record data to test the hypothesis. 6. Process the data to calculate a mean, accounting for anomalies. 7. Display data appropriately, including a table for results with units. 8. Describe and explain patterns using ideas about diffusion.

	concentration gradient. This is known as passive transport.	

Key Stage 3 Curriculum Year 7

Autumn 2	Knowledge	Skills
Atoms and The Periodic Table	Pupils know that an atom is the simplest particle of an element. Pupils can explain that an element is a pure substance made of one kind of atom. It cannot be split up into anything simpler without losing its characteristics. Elements are the building blocks for everything in the world. When a molecule of a pure substance contains atoms of two or more elements combine in the fixed ratio, it is said to be a compound. Pupils can explain that in Dalton's model atoms cannot be broken down into anything simpler the atoms of a given element are identical to each other the atoms of different elements are different from one another the atoms of	1. Label a diagram of the atom and describe its structure. 2. Explain the Dalton's model of atoms. 3. Define elements, name the two types of elements and locate them on the periodic table. 4. Recognise elements from drawings or names. 5. Describe compounds and use particle diagrams to represent them. 6. Describe the rules for writing chemical symbols. 7. Describe how the periodic table has developed over time. 8. State details about the life of Dmitri Mendeleev. 9. Describe some of the stages in the formation of the periodic table. 10. Explain how the properties of the elements were used in early versions of the periodic table.

	different elements join to make compounds during chemical reactions atoms rearrange to make different substances. Pupils can easily tell you that the periodic table is a system for arranging the chemical elements. Pupils know that Mendeleev developed the periodic table. The periodic table contains periods and groups; metals and non-metals. Pupils can explain how patterns in reactions can be predicted with reference to the periodic table.	

Key Stage 3 Curriculum Year 8

Autumn 2	Knowledge	Skills
Atoms and The Periodic Table	Pupils can show that a chemical formula is a way that chemists describe a molecule. The formula says what atoms, and how many of each type, are in the molecule. Sometimes the formula shows how the atoms are linked, and sometimes the formula shows how	1. Write chemical symbols and formulae for elements and compounds. 2. Define 'properties'. 3. Describe some properties and uses of metals and non-metal elements. 4. Make a simple compound and explain how it is different from the elements it is made of.

	the atoms are arranged in space. The letter shows what chemical element each atom is. Pupils can use this information and write chemical symbols and formulae for elements and compounds. Pupils know that t periodic table has varying physical and chemical properties of different elements. Pupils will be able to list the properties of metals and non-metals. Pupils will look at conductivity, boiling points, melting points and what they look like.	5. Name compounds given the elements contained. 6. Name compounds given the elements or formulae. 7. Interpret formulae in terms of the number of each atom present.

Key Stage 3 Curriculum Year 9

Autumn 2	Knowledge	Skills
Atoms and The Periodic Table	Pupils can work out the electronic configuration which is defined as the distribution of electrons into the orbitals of an atom. Every neutral atom consists of a fixed number of electrons which is equal to the number of protons and is called the atomic number.	1. Draw and write electron configurations for any of the first 20 elements. 2. Describe the link between electron configuration and place in the periodic table. 3. Describe some of the properties of group 1 elements.

	Pupils know that Group 1 contains elements placed in a vertical column on the far left of the periodic table. The elements in group 1 are called the alkali metals. Pupils know that Group 7 contains non-metal elements placed in a vertical column on the right of the periodic table. The elements in group 7 are called the halogens. Group 7 is on the right-hand side of the periodic table, next to group 0 The halogens show trends in their physical and chemical properties. Pupils know that Group 8 called The noble gases are a group of elements that are all gases. These elements are monoatomic, meaning each molecule is a single atom They almost never react with other elements.	4. Describe trends in physical and chemical properties of group 1 elements. 5. Write word (or symbol) equations to represent group 1 element reactions with oxygen and water. 6. Describe trends in physical and chemical properties of group 7 elements. 7. Write word equations to represent group 7 element reactions with group 1 elements. 8. Explain the reactivity of group 7 elements. 9. Represent displacement reactions using equations. 10. Describe properties of group 0 elements. 11. Describe uses of group 0 elements.

Key Stage 3 Curriculum Year 7

Spring 1	Knowledge	Skills

Biological Systems and Processes	**Pupils will know that an organ is a group of tissues in a living organism that has a specific form and function. Organs are grouped together into organ systems. Organ systems perform a specific task. In most animals there are ten major organ systems which include the skeletal system, digestive system, nervous system, circulatory system, muscular system, respiratory system, endocrine system, excretory system, reproductive system, endocrine system and muscular system.** **Pupils can describe the structure and functions of the human skeleton system, to include support, protection, movement and making blood cells.** **Pupils can describe the interaction between skeleton and muscles, including the measurement of force exerted by different muscles.** **Pupils know that when a muscle contracts (bunches up), it gets shorter and so pulls on the bone it is attached to. When a muscle relaxes, it goes back to its normal size. Muscles can only contract and relax, so they always work in pairs called antagonistic muscles.**	1. **Describe the biological organ systems and their main process.** 2. **Label a diagram of the bones in the skeletal system.** 3. **The skeletal system provides support and protection for the rest of the organ systems. It is made up of bones, ligaments, tendons, and cartilage.** 4. **Describe the role of different parts of joints.** 5. **Describe the function and give examples of antagonistic muscle pairings.** 6. **Identify major muscle groups involved in common movements.** 7. **Describe how some of the muscular tissue in our organs work.** 8. **Measure the force of some of the skeletal muscles in the body.**

Key Stage 3 Curriculum Year 8

Spring 1	Knowledge	Skills
Biological Systems and Processes	**Pupils should know that a healthy diet consists of all the food groups that contains carbohydrates, lipids (fats and oils), proteins, vitamins, minerals, dietary fibre and water in the correct amounts and why the body needs each food group and what it is used for.** **Pupils can calculate the energy requirements in a healthy daily diet.** **Pupils can explain the consequences of imbalances in the diet, including obesity, starvation and deficiency diseases.** **Pupils know that the digestive system processes food into substances that different parts of the body can use for energy and nutrients. It includes organs such as the stomach, gallbladder, intestines, liver, and pancreas.**	1. **Describe what a healthy diet is.** 2. **Name the seven food groups and how the body uses each nutrient.** 3. **Explain what an unhealthy diet looks like.** 4. **Explain how obesity is the leading factor of heart disease.** 5. **Describe that a deficiency is caused by the lack of an element in the diet, usually a particular vitamin or mineral.** 6. **Label a diagram of the organs in the digestive system.** 7. **Describe the function of the digestive system.** 8. **Describe and explain some of the adaptations of the digestive system and link these to diffusion.** 9. **Explain that the villi are small, finger-like structures in the small intestine. They help to absorb digested food. The villi increases the surface area of the intestinal walls. A larger surface area allows nutrients to be taken in more quickly.**

	Villi (singular is villus) are small, finger-like structures in the small intestine. They help to absorb digested food. The villi increases the surface area of the intestinal walls. A larger surface area allows nutrients to be taken in more quickly. **Digestive enzymes are chemicals which help to speed up the breakdown of large food molecules. Different types of enzymes can break down different nutrients.** **Pupils can explain that amylase and other carbohydrase enzymes break down carbohydrates into sugar e.g. starch into glucose.** **Pupils can explain that protease enzymes break down proteins into amino acids.** **Pupils know that lipase enzymes break down lipids (fats and oils) into fatty acids and glycerol.** **At very acidic and alkaline pH values and high temperatures the shape of the enzyme is altered so that it is no longer complementary to its specific substrate. This effect can be permanent and irreversible and is called denaturation.** **Pupils can explain that the heart is the organ, or body part, that pumps**	10. **Explain that digestive enzymes are special proteins that can break large food molecules into small food molecules.** 11. **Know that amylase and other carbohydrase enzymes break down carbohydrates into sugar e.g. starch into glucose.** 12. **Know that protease enzymes break down proteins into amino acids.** 13. **Know that lipase enzymes break down lipids (fats and oils) into fatty acids and glycerol.** 14. **Explain how temperature and pH affects enzyme activity.** 15. **Explain the term denaturation.** 16. **Describe the structure and function of the heart.** 17. **Explain the movement of blood around the heart.** 18. **Explain why the heart has a double circulation.** 19. **Identify the components of the blood and explain what each part does.** 20. **State the differences between the three blood vessels; arteries, veins and capillaries.** 21. **Explain how the blood vessels are adapted to their function.**

	blood through the body. It is the main organ of the cardiovascular system. The cardiovascular system carries substances to and from all parts of the body in the blood through blood vessels. **Pupils know that the right pump of the heart sends deoxygenated blood to the lungs where it becomes oxygenated and returns back to the heart.** **The left pump of the heart sends the newly oxygenated blood around the body. By the time this blood returns to the heart, it has returned to a deoxygenated state.**	

Key Stage 3 Curriculum Year 9

Spring 1	Knowledge	Skills
Biological Systems and Processes	**Pupils know the structure and functions of the gas exchange system in humans including adaptations to function.**	1. **Label the parts of the respiratory system.** 2. **Describe the path oxygen takes into the blood.**

	Pupils can explain the mechanism of breathing to move air in and out of the lungs, using a pressure model to explain the movement of gases, including simple measurements of lung volume. Discuss the impact of exercise, asthma and smoking on the human gas exchange system.	3. Describe the adaptations of the breathing system to allow for efficient diffusion. 4. Describe, using knowledge of diffusion, how gases are absorbed from the alveoli into the bloodstream. 5. Explain how alveoli are adapted for their function. 6. Describe the composition of the air we breathe in and out. 7. State the word equation for aerobic respiration. 8. State the word equation for anaerobic respiration. 9. Describe the effects of cigarettes on the tissues of the lungs and on gaseous exchange. 10. Describe and explain the impact on the health of smokers and their unborn babies.

Key Stage 3 Curriculum Year 7

Spring 2	Knowledge	Skills
Reproduction and Variation	Pupils know that puberty is the process of physical changes through which a child's body matures into an adult body capable of sexual reproduction.	1. Describe some of the changes in males and female bodies during puberty. 2. Label diagrams of the human male and female reproductive systems.

	Pupils can describe the differences between the male and female reproductive systems and label each part. **Pupils know that the sex cells or gametes are called egg cells which are produced in the ovaries of a female and sperm cells which are produced in the testes of a male.** **Pupils know that in animals, fertilisation is when a males sperm and a females egg join together. The genes from the mother and father are combined to make new life. Pupils will be able to discuss the process of fertilisation and how the embryo implants itself in the lining of the uterus.** **Pupils know that a fertilised ovum divides to form a ball of cells called an embryo. The embryo attaches to the lining of the uterus. It begins to develop into a foetus and then becomes a baby when it is born. It takes about 40 weeks for a foetus to develop in the uterus. This time is called gestation.** **Pupils can explain that drugs can affect the foetus - slowing the growth of the foetus, reducing the amount of oxygen and causing bleeding - which can be life threatening. Drinking alcohol or**	3. **Describe the function of each of the parts of the reproductive systems.** 4. **Describe adaptations of the egg and sperm cells to their function.** 5. **Describe how reproduction takes place in humans.** 6. **Describe the processes of fertilisation and implantation.** 7. **Explain the role of cilia found in the oviduct.** 8. **Describe the development of the foetus and the function of the placenta, umbilical cord and amniotic fluid.** 9. **Explain how the foetus gets nutrients and oxygen, and how waste it is excreted.** 10. **Describe how a baby is born.** 11. **Describe risks of smoking and alcohol during pregnancy.** 12. **Use data to describe the impact of smoking on an unborn baby.** 13. **Describe the main events in the menstrual cycle.** 14. **Pupils can explain the different type of contraceptives and how they are used.** 15. **Carry out the flower dissection and identify structures in the flower.** 16. **Being able to label the different parts of a flowering plant.** 17. **Analyse how the structures in the flower relate to their function.** 18. **Identify the male and female reproductive organs of a flower.** 19. **To know that pollination is the transfer of pollen from a male part of a plant to a female part of a plant.**

	smoking while pregnant are also dangerous and can increase the risk of stillbirth, premature birth and long-term health conditions. **Pupils know that human fertility is controlled by hormones, so fertility can be controlled using hormonal forms of contraception. Pupils can discuss the different forms of mechanical, chemical, surgical and natural contraceptive methods used to prevent a pregnancy.** **Pupils know that insect-pollination of flowering plants is responsible for the majority of the world's flowering diversity and is an essential part of plant reproduction and flowers have bright colours, smells and nectar which encourage pollinators to pay them a visit.** **Pupils can explain flowering plants reproduce sexually through a process called pollination. The flowers contain male sex organs called stamens and female sex organs called pistils. The male and female sex cells produced from the male and female sex organs must meet for reproduction to begin.** **Pupils know that pollination is the act of transferring pollen grains from the male anther of a flower to the female stigma.**	**20. Describe how pollination enables fertilisation and the production of seeds.** **21. Describe the different methods of pollination.** **22. To know that pollination enables fertilisation and the production of seeds in a plant.** **23. Describe the ways in which seeds can be dispersed.** **24. Explain how plants are adapted for seed dispersal.**

	Pupils know as plants cannot move like animals they must adopt a different method of transferring these pollen grains. These include wind-pollinated plants which let their pollen blow in the wind and hope that their pollen grains reach another plant for pollination and insect-pollinated plants that use insects and other animals to carry their pollen grains to other plants.	

Key Stage 3 Curriculum Year 8

Spring 2	Knowledge	Skills
Reproduction and Variation	Pupils can explain that DNA is the genetic code which makes up genes, which are responsible for giving an organism a specific characteristic. Pupils can illustrate a simple model of chromosomes, genes and DNA in heredity, including the part played by Watson, Crick, Wilkins and Franklin in the development of the DNA model.	1. DNA is the genetic code which makes up genes, which are responsible for giving an organism a specific characteristic. 2. Explain the differences in characteristics between individuals of the same species is called variation. 3. Explain that some variation is passed on from parents to offspring, via genes during reproduction. This is inherited variation. 4. Explain that some variation is the result of differences in the

	Pupils can describe the variation between individuals within a species being continuous or discontinuous, and include measurement and graphical representation of variation.	surroundings, or what an individual does. This is called environmental variation. 5. Explain that variation is the differences between individuals of the same species, caused by genetic and environmental factors.

Key Stage 3 Curriculum Year 9

Spring 2	Knowledge	Skills
Reproduction and Variation	Pupils can describe that the variation between species and between individuals of the same species means some organisms compete more successfully, which can drive natural selection. Know that changes in the environment may leave individuals within a species, and some entire species, less well adapted to compete successfully and reproduce, which in turn may lead to extinction. Pupils know that selective breeding is when organisms are deliberately	1. Evolution explains how better adapted organisms have an advantage and are more likely to have offspring with this same adaptation. 2. Natural selection is known as 'the survival of the fittest'. The best adapted organisms are able to survive. 3. Explain that the most desirable characteristics get passed down from parents to their offspring. 4. Explain how scientists have used fossils to look at how organisms have evolved over time. 5. Explain that selective breeding is when organisms are deliberately bred

	bred so their offspring have the desirable characteristics. Pupils know that genetic conditions are inherited from parents - Cystic fibrosis causes the build-up of sticky mucus in the gas exchange and the digestive system. This causes infections in the lungs and makes it difficult to digest food and Sickle-cell disorder which results in red blood cells with a sickle or crescent shape, rather than the characteristic bi-concave shape. These cells do not live as long as normal cells, can carry less oxygen to the body's organs and can cause blockages in blood vessels. If these blockages are in the brain or heart, this can cause a stroke or heart attack. Pupils can explain the work of Charles Darwin who devised the theory of evolution through natural selection.	so their offspring have the desirable characteristics. 6. Explain how cystic fibrosis and sickle cell anaemia is inherited by parents. 7. Explain Charles Darwin's theory of evolution.

Key Stage 3 Curriculum Year 7

Summer 1	Knowledge	Skills

Light and Space	**Pupils know that luminous means giving light. Hence, the luminous object means the object which gives light. The non-luminous or illuminated object means the object which cannot give light.** **Pupils can explain how light reflects off smooth, shiny surfaces,. In this instance smooth, shiny surfaces reflects light well. Most of the light that hits the surface bounces off, however, rough, dull surfaces do not reflect light well. Some light bounces off the object but most of the light is absorbed.** **Pupils know that light can pass through certain objects and cannot pass through other objects. For example, transparent objects are see-through and able to let light through such as a glass window. A translucent object is semi-transparent and is able to let some light pass through such as a thin plastic carrier bag. An opaque object is able to completely block light such as a brick wall. An opaque object will produce shadows.** **Pupils can explain the Law of Reflection - the angle of incidence = the angle of reflection.**	1. **Explain the difference between luminous and non-luminous objects and give examples.** 2. **Explain that we need a light source in order to see things.** 3. **Describe some properties of light.** 4. **Explain that light is a type of electromagnetic radiation that can be detected by the eye.** 5. **Describe what happens when light hits a smooth, shiny surface and a dull, rough surface.** 6. **Describe and explain specular and diffuse reflections.** 7. **Explain what happens to light when it passes through transparent, translucent and opaque objects.** 8. **Explain how shadows are formed.** 9. **Draw accurate light ray diagrams to illustrate how light travels from the light source, reflects off and object and enters the human eye.** 10. **State the law of reflection.** 11. **Draw the pathway light takes through a glass block and explain how this causes the light to bend which is known as refraction.** 12. **Measure the angle of refraction using a protractor** 13. **Describe and explain how refraction takes place using key words and phrases.** 14. **List the colours of the visible spectrum.** 15. **Describe how white light can be dispersed to give a range of different colours using a prism.**

	Pupils can explain when light travels from air into glass it slows down because glass is more dense than air. This change in speed can cause the light to bend at the boundary between the air and glass. The change in direction of a beam of light as it travels from one material to another is called refraction.	16. Explain why we see objects as a particular colour. 17. Describe and explain how coloured filters change white light. 18. Predict the colours of coloured objects in coloured light.

Key Stage 3 Curriculum Year 8

Summer 1	Knowledge	Skills
Light and Space	Pupils know that the eye is a ball with a hole at the front, the pupil, which lets in light. Inside the eye is a lens which focuses the light onto a surface at the back of the eyeball. This surface is called the retina and is made up of special cells which detect light and send messages to our brain, allowing us to see.	1. Label the parts of the human eye. 2. Describe how an image is formed and how we see. 3. Safely carry out an eye dissection. 4. Describe how the eye focuses on near and far objects. 5. Explain the cause of long and short sightedness and how this can be corrected.

	Pupils know the two common defects of the eyes are myopia (short-sightedness) and hyperopia (long-sightedness). In both cases rays of light do not focus on the retina so a clear image is not formed. Someone with short-sight can see near objects clearly, but cannot focus properly on distant objects. Short-sightedness can be corrected by placing a concave lens in front of the eye. Someone who is long-sighted can see distant objects clearly, but they cannot focus properly on near objects. Long-sightedness is corrected by putting a convex lens in front of the eye by using contact lenses or having eye surgery.	

Key Stage 3 Curriculum Year 9

Summer 1	Knowledge	Skills

Light and Space	**Pupils know that s planet is a large, rounded astronomical body that is neither a star nor its remnant. The Moon is a large natural object that orbits, or travels around, Earth. A star is a ball of very hot gas, mostly hydrogen and helium that shines in the sky. A galaxy is a huge collection of gas, dust, and billions of stars and their solar systems, all held together by gravity.** **Pupils can explain that the Earth orbits the Sun, it rotates on its axis. Each rotation of Earth on its axis takes 24 hours. This period of time is called a day. As Earth rotates on its axis, the side of the Earth facing towards the Sun is lit by the Sun. People living on this side of the Earth experience day. The opposite side of Earth at this point is facing away from the Sun and people living on this side experience night.** **Pupils know that the Earth takes approximately 365 days to orbit once around the Sun. This length of time is called a year.** **Days, years and months are periods of time which are determined by the movement of Earth around the Sun, and the movement of the Moon around Earth.** **The Earth's axis of rotation is tilted, which leads to changing seasons as**	1. **Give a definition of a planet, the moon, a star and a galaxy.** 2. **Describe how the Earth moves around the sun and why the Earth is tilted.** 3. **Outline why we have day and night, months and seasons.** 4. **Explain the different phases of the moon.** 5. **List the different planets in our solar system.**

	Earth itself orbits around the Sun. A month is measured by the time taken for the Moon to orbit Earth once. The time for the Moon to go through a complete cycle (from a full Moon to the next full Moon) is approximately 29.5 days. Pupils know that there are eight planets that travel around it. The planets are Mercury, Venus, Earth, Mars, Jupiter, Saturn, Uranus and Neptune. There are also many smaller objects like moons, asteroids and comets.	

Key Stage 3 Curriculum Year 7

Summer 2	Knowledge	Skills
Electricity and Magnetism	Pupils know that circuit symbols are used in circuit diagrams showing how a circuit is connected together. Pupils can draw electric circuit diagrams that represent the	1. Name common circuit symbols of components. 2. Draw circuit diagrams using symbols of components. 3. Make basic observations on what is needed for a circuit to work.

	connections and components of a circuit through lines and symbols. **Pupils know that a electric circuit called a series circuit, all of the current flows through each part of the circuit. In a parallel circuit the current is divided into separate paths.** **Pupils can demonstrate that the electric current in a circuit is measured in amperes using an ammeter.** **Pupils can describe that in a series circuit, the components are connected in a line and the same current flows through all of them. In a parallel circuit, the components are connected so that each component has its own separate branch and the same voltage is applied to each component.** **Pupils know that when two opposite magnetic poles are close, they attract each other. When like poles are pushed together, there is a force of repulsion. The rule for magnets is that like poles repel and unlike poles attract.** **Pupils know that a magnetic field is the region around a magnet where a force acts on another magnet or on a magnetic material.**	4. **Explain how the current passes through a complete circuit.** 5. **Use an ammeter to record measurements of current at different points in a series circuit.** 6. **Describe how current behaves in a series circuit.** 7. **Describe and explain the effect of adding extra bulbs on current.** 8. **Recognise and draw parallel circuits.** 9. **Make and record measurements of current in parallel.** 10. **Describe how current behaves in parallel.** 11. **Describe how the charge can produce a force between charged objects.** 12. **Draw the field lines around a magnet.** 13. **Describe the magnetic field around a magnet, or the Earth, using fields lines.** 14. **Describe the forces of attraction and repulsion between magnets.**

Key Stage 3 Curriculum Year 8

Summer 2	Knowledge	Skills
Electricity and Magnetism	**Pupils know that the work required to transfer a charge from one point to another is described as potential difference.** **Pupils know that the potential difference is measured in volts, whereas the resistance is measured in ohms.** **Pupils know that when two opposite magnetic poles are close, they attract each other. When like poles are pushed together, there is a force of repulsion. The rule for magnets is that like poles repel and unlike poles attract.**	**1. Describe potential difference using a model.** **2. Describe how to use a voltmeter to measure potential difference across components.** **3. Describe potential difference in series circuits.** **4. Describe potential difference in parallel circuits.** **5. Compare patterns of potential difference in series and parallel circuits.** **6. Investigate the relationship between current, potential difference and resistance.** **7. Explain attraction and repulsion of magnets using field line patterns.**

Key Stage 3 Curriculum Year 9

Summer 2	Knowledge	Skills
Electricity and Magnetism	**Pupils know how to calculate the potential difference between the two sites using the formula Δ V = E d . Divide the resistance present in the circuit by the current flow rate. The potential difference, expressed in volts, is the outcome of the multiplication. Ohm's Law, V = I R , is the name of this equation.** **Pupils know that static electricity is the result of an imbalance between negative and positive charges in an object. These charges can build up on the surface of an object until they find a way to be released or discharged. One way to discharge them is through a circuit.** **Pupils can demonstrate that electromagnets can be created by wrapping a wire around an iron nail and running current through the wire. The electric field in the wire coil creates a magnetic field around the nail.** **Pupils can explain that a wire carrying a current creates a magnetic field. This can interact with another magnetic field, causing a force that pushes the wire**	**1. Use an equation to calculate current, potential difference or resistance.** **2. Describe what is meant by static electricity.** **3. Describe how objects can become charged.** **4. Describe how to make a simple electromagnet.** **5. State how electromagnets are used in a variety of devices.** **6. Draw the shape of the magnetic field around a straight wire.** **7. Understand how the motor effect is caused by magnetic fields.** **8. State the factors affecting the speed of a direct motor.**

	at right angles. This is called the motor effect. **Pupils know that motor performance depends on three elements such as voltage across terminals, resistance across terminals, and magnetic force.**	