Fairlands Curriculum Progression Map

Subject: Science – Year 5

Year 5	Autumn 1	Autumn 2	Spring 1	Spring 2	Summer 1	Summer 2
Topic and *investigation project*	**Forces** *What force is needed to move a shoe across different surfaces?*	**Cells and diffusion** *How do chemicals get in and out of our cells?*	**Earth and space** *Who is the most important space scientist of all time?*	**Light** *How do our shadows change during the day?*	**Variation and evolution** *How did Charles Darwin and Alfred Wallace make their theories of evolution?*	**Animal body systems** *How can we keep our hearts healthy?*
Skills	Take measurements, using a force meter with accuracy and precision. Take repeat readings. Record data and results using tables and bar charts.	Recording data using scientific diagrams and labels.	Report and present findings from enquiries in a presentation. Identify scientific evidence that has been used to support or refute ideas.	Plan different types of scientific enquiries to answer questions, including recognising and controlling variables.	Report and present findings from enquiries in a diary. Identify scientific evidence that has been used to support or refute ideas.	Report and present findings from enquiries into heart health. Identify scientific evidence that has been used to support or refute ideas.
Knowledge	Explain that unsupported objects fall towards the Earth because of the force of gravity acting between the Earth and the falling object. Identify the effects of air resistance, water resistance and friction, that act between moving surfaces. Recognise that some mechanisms including levers, pulleys and gears allow a smaller force to have a greater effect.	Organisms are made up of one or more cells, which have common structures that carry out life processes. Cells are usually too small to be seen without a microscope, but have a range of three-dimensional shapes and sizes. Chemical particles move through the cell cytoplasm by diffusion, and some chemical particles can enter and leave a cell by diffusing through the cell membrane.	Describe the movement of the Earth and other planets relative to the sun in the solar system. Describe the movement of the moon relative to the Earth. Describe the sun, Earth and moon as approximately spherical bodies. Use the idea of the Earth's rotation to explain day and night and the apparent movement of the sun across the sky.	Recognise that light appears to travel in straight lines. Use the idea that light travels in straight lines to explain that objects are seen because they give 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. Explain why shadows have the same shape as the objects that cast them.	Recognise that living things have changed over time and that fossils provide information about living things that inhabited the Earth millions of years ago. Recognise that living things produce offspring of the same kind, but normally offspring vary and are not identical to their parents. Identify how animals and plants are adapted to suit their environment in different ways and that	Identify and name the main parts of the human circulatory system, and describe the functions of the heart, blood vessels and blood. Recognise the impact of diet, exercise, drugs and lifestyle on the way their bodies function. Describe the ways in which nutrients and water are transported within animals, including humans.

					adaptation may lead to evolution.	
Key Vocabulary / reading opportunities	Comprehension exercises: Push and pull. How things move. Sir Isaac Newton.	Comprehension exercises: Microscopes magnify things. Solids, liquids and gases.	Comprehension exercises: Phases of the moon. Galileo and his telescope. Why does the moon orbit Earth? The inner planets.	Comprehension exercises: The light spectrum. The scientific method.	Comprehension exercises: Adapting to survive. The tundra biome. Hide and seek.	Comprehension exercises: It circulates. Tissues, organs and systems.
Stretch and Challenge	Draw force arrows to scale on diagrams to show how forces act on an object.	Design a unicellular organism that performs all of the life processes.	The Solar System to scale. Comet vs. Asteroid. Why does the Earth spin?	Use simulation to find patterns in reflected rays.	Predicting inheritance through generations of a family tree.	Make a model arm to show antagonistic muscles.
Links to Modern Britain	Rule of law: follow standard procedures during experiments.	Rule of law: follow standard procedures during experiments.	Democracy: voting for the best scientist of all time.	Rule of law: follow standard procedures during experiments.	Respect and tolerance: embracing diversity when discussing variation amongst humans.	Democracy: team roles for group research and presentation.
Gatsby links	Tim Peake video from International Space Station.	Biological organisation – careers video.	Research historical and modern-day space scientists.	What is an optician? video	Dig in to palaeontology careers video.	Research the role of a dietician, GP, radiographer, nurse and cardiologist in looking after heart health.
Science lessons focus on learning towards understanding a Big Idea. Hinterland Knowledge is how we use activities to give the context to what the students are learning.	**Forces make things change**. Explore the idea that no force means no change – what is happening right now to Voyager spacecraft in interstellar space?	**Organisms are made of one or more cells** Use bioviewers and microscopes to observe cells. **Cells need a supply of molecules to carry out life processes.** Visking tubing experiment to show permeability to some	**Understanding the uniqueness of the Earth and the vastness of space gives us perspective and awe.** Use images and videos from space craft to give different perspectives on the night sky. Use recent	**Waves radiate information.** **Understanding waves helps us to communicate.** Make a periscope. Experiment with reflected light. Discuss uses of mirrors and light reflection.	**Differences between organisms cause species to evolve by natural selection of better adapted individuals.** Look at fossils – why are these organisms no longer alive? **The great diversity of organisms is the result of evolution.**	**Organisms are made of one or more cells.** Use bioviewers and microscopes to observe blood, arteries and veins.

		chemicals and not others.	examples from the news where possible.		Watch natural history documentary.	

Subject: Science – Year 6

Year 6	Autumn 1	Autumn 2	Spring 1	Spring 2	Summer 1	Summer 2
Topic and *investigation project*	**Reversible changes** *How can we speed up dissolving?*	**Electricity** *What effect do cells have on the brightness of a bulb?*	**Chemical changes** *Which acids react fastest with bicarbonate of soda?*	**Life cycles** *How does the environment affect the germination of seeds?*	**Classification** *How do invertebrates survive?*	**Sports science** *Do all fizzy drinks have the same amount of sugar in them?*
Skills	Planning different types of scientific enquiries to answer questions, including recognising and controlling variables where necessary. Using test results to make predictions to set up further comparative and fair tests.	Plan scientific enquiries to answer questions, including recognising and controlling variables. Use test results to make predictions to set up further comparative and fair tests. Record data and results using scientific diagrams and labels.	Take measurements of circumference using a measuring tape. Record results using tables. Explain the degree of trust in results.	Take measurements of length volume, using rulers and measuring cylinders. Record results using tables and line graphs. Report conclusions including scientific explanations and causal relationships.	Report and present findings from enquiries in a diary. Identify scientific evidence that has been used to support or refute ideas.	Plan an investigation to find out about sugar in fizzy drinks, controlling variables. Record data and results using tables and bar charts. Use results to make predictions and set up further tests. Report conclusions including scientific explanations and causal relationships. Explain the degree of trust in results.
Knowledge	Compare and group everyday materials on the basis of their properties. Know that some materials will dissolve in liquid to form a solution, and describe how to recover a substance from a solution. Use knowledge of solids, liquids and gases to decide how mixtures might be separated, including through filtering, sieving and evaporating.	Associate the brightness of a lamp or the volume of a buzzer with the number and voltage of cells used in the circuit. Compare and give reasons for variations in how components function, including the brightness of bulbs, the loudness of buzzers and the on/off position of switches. Use recognised symbols when representing a	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.	Describe the differences in the life cycles of a mammal, a bird, an amphibian and an insect. Describe the life process of reproduction in some plants and animals. Describe the changes as humans develop to old age, including the changes experienced in puberty.	Describe how living things are classified into broad groups according to common observable characteristics and based on similarities and differences, including microorganisms, plants and animals. Give reasons for classifying plants and animals based on specific characteristics.	Recognise the impact of diet, exercise, drugs and lifestyle on the way our bodies function.

	Give reasons for the uses of everyday materials. Demonstrate that dissolving, mixing and changes of state are reversible changes.	simple circuit in a diagram.				
Key Vocabulary/reading opportunities	Comprehension exercises: The water cycle. Measuring temperature. Solids, liquids and gases.	Comprehension exercise: Electricity.	Read instructions for experiments.	Comprehension exercise: Plant life cycles.	Read about invertebrates to research their characteristics.	Read about the ingredients and purpose of sports drinks.
Stretch and Challenge	Particle arrangements in solids, liquids and gases. Mixtures – which states are in each mixture?	How are lights arranged in a house compared to a set of Christmas tree lights?	How can you make different concentrations of acid?	Reproductive strategies comprehension.	Research different sub-groups of arthropods.	Research into sugary fizzy drinks and respiration.
Links to Modern Britain	Rule of law: follow standard procedures during experiments, following lab safety rules.	Democracy: joint decision making to solve circuit problems.	Rule of law: follow standard procedures during experiments, following lab safety rules.	Democracy: team roles in group research.	Democracy: students identify questions to ask each other about their research into invertebrates.	Democracy: team roles when carrying out experiments.
Gatsby links	How to make filthy water drinkable: TED talk.	Science, why bother? Electricity video.	Research chemists such as Spencer Silver, Ruth Benerito and Jamie Garcia.	Research the careers of naturalists such as David Attenborough and Jane Goodall.	Use Marine Biologist fact file to write job application letter.	Sports and exercise scientist career video.
Science lessons focus on learning towards understanding a Big Idea. Hinterland Knowledge is how we use activities to give the context to what the students are learning.	**Materials are either made of a single chemical substance or a mixture of substances which each have distinctive properties.** Experiments to discover properties of materials and carry out dissolving and evaporating.	**The everyday world uses technology made using our understanding of electrical charge.** Experiment with circuit components to create circuits that would be found in the home, e.g. Christmas tree lights.	**During chemical reactions, new substances are formed.** Students make copper sulfate and rust, and observe new products during burning and when reacting acid with bicarbonate of soda.	**Genetic information is passed from each generation to the next, affecting the development of organisms.** Take geranium cuttings, germinate cress seeds and observe development of chicken eggs.	**The great diversity of organisms is the result of evolution.** Use news reports about recent discoveries of new species, or extinctions of existing ones. What makes these groups so rare?	**The health of an individual results from interactions between its body, behaviour, environment and other organisms.** Research, plan and carry out a full investigation into the types and amount of sugar in fizzy drinks.

Subject: Science – Year 7

Year 7	Autumn 1	Autumn 2	Spring 1	Spring 2	Summer 1	Summer 2
Topic and *investigation project*	**Forces and motion** *How does force affect the extension of a spring?*	**Particles** *How can we identify ink from a crime scene?*	**Space physics** *What effect does speed have on the size of a meteorite impact crater?*	**Reproduction and cells** *Which seeds are dispersed the furthest from an exploding seed pod?*	**Atoms and elements** *What is the change in mass when magnesium burns?*	**Digestion** *What effect do enzymes have in biological washing powder?*
Skills	Make measurements and use appropriate techniques and apparatus. Draw tables and graphs. Use observations and data to draw conclusions. Evaluate the reliability of methods and Evaluate data, identifying random and systematic error.	Use simple equations and carry out appropriate calculations. Use observations to draw conclusions.	Make measurements and use appropriate techniques and apparatus. Draw tables and graphs. Use observations and data to draw conclusions. Evaluate the reliability of methods and Evaluate data, identifying random and systematic error.	Plan an investigation, identifying variables and making a prediction. Evaluate risks.	Scientific methods and theories develop with new evidence. Make measurements and use appropriate techniques and apparatus. Draw tables and graphs. Use observations and data to draw conclusions. Evaluate data.	Plan an investigation, identifying variables and making a prediction. Evaluate risks.
Knowledge	Calculating speed. Distance-time graphs. Relative motion. Pushes and pulls. Using force arrows in diagrams of balanced and unbalanced forces. Moment as the turning effect of a force. Forces associated with deforming objects, with rubbing between surfaces and with pushing things out of the way. Measuring forces in Newtons. Hooke's law.	Properties of the states of matter and changes of state in terms of the particle model. Pure substances and mixtures. Dissolving and diffusion in terms of the particle model. How to identify pure substances. How to separate mixtures.	Calculation of weight from mass and gravitational field strength. Gravity forces on other planets and stars, and between the Earth and the moon and Sun. Stars in our galaxy and other galaxies. The effect of the Earth's tilt on seasons and day length. The light year as a unit of astronomical distance.	Observing cells using a light microscope. Functions of cell organelles. Comparing plant and animal cells. The role of diffusion in the movement of materials in and between cells. Structural adaptations of unicellular organisms. Organisation of multicellular organisms. Structure and function of human reproductive systems. Gametes, fertilisation, gestation and birth.	Structure of an atom. Differences between atoms, elements and compounds. Chemical symbols and formulae. Conservation of mass.	Components of a healthy human diet. Calculations of energy requirements. Health consequences of diet imbalances. Tissues and organs of the human digestive system. How the digestive system digests food using enzymes. What catalysts do. The importance of bacteria in the human digestive system.

	Work done and energy changes on deformation. Non-contact forces. Forces cause objects to start or stop moving or change speed.			Menstrual cycle. Reproduction in plants.		
Key Vocabulary/reading opportunities	Comprehension exercise: Forces and motion.	Comprehension exercise: Forms of matter.	Comprehension exercise: What is gravity?	Comprehension exercise: What's in your cells?	Comprehension exercises: Atoms and Elements. It's Elemental.	Comprehension exercises: Tissues, organs and systems. Down the hatch.
Stretch and Challenge	Explain the forces acting on an object that is moving at constant speed.	Explain what is happening to particles during melting and boiling and relate this to temperature.	Explain why the angle of the Sun changes the effect of its heating.	Link how the amniotic fluid and placenta enable a foetus to obtain oxygen and food and maintain a constant temperature.	Use a symbolic chemical equation to predict and explain an apparent change of mass in an open system where a reactant or product is in the gas state.	Explain which foods can be absorbed using the idea of particle size.
Links to Modern Britain	Rule of law: follow standard procedures during experiments.	Rule of law: consider the uses and limitations of forensic evidence.	Respect and tolerance: Consider the importance of our observations of the heavens in our cultural traditions.	Individual liberty: the effect of maternal lifestyle on the foetus – choices and responsibilities.	Rule of law: follow standard procedures during experiments, following lab safety rules.	Rule of law: follow standard procedures during experiments, following lab safety rules.
Gatsby links	Science – why bother? Forces careers video.	Forensic scientist careers video.	Maggie Aderin-Pocock – space scientist video.	Midwife careers video.	Mineral technology apprentice careers video.	Dietician careers video.
Science lessons focus on learning towards understanding a Big Idea. Hinterland Knowledge is how we use activities to give the context to what the students are learning.	**Forces make things change. Understanding forces helps us to predict and control physical change.** Measure forces with Newton meters to investigate friction, stretching of springs, upthrust and turning effect.	**All matter is made up of atoms. The behaviour and structural arrangement of atoms explains the properties of different materials.** Use the particle model to explain experiments in state changes, gas pressure, diffusion, dissolving and separating substances.	**Understanding the uniqueness of the Earth and the vastness of space gives us perspective and awe.** Use images and videos from space craft using recent examples from the news where possible. Compare to models that explain our observations of space.	**Organisms are made of one or more cells, which need a supply of energy and molecules to carry out life processes.** Use microscopes, diagrams and models to show how cells contribute to the growth and development of animals and plants.	**All matter is made up of atoms. The behaviour and structural arrangement of atoms explains the properties of different materials.** Use experiments to measure changes during chemical reactions. Use models to represent the rearrangement of atoms to make compounds.	**Organisms are made of one or more cells, which need a supply of energy and molecules to carry out life processes.** Use chemical tests to identify nutrient molecules in food. Use models of different phases of digestion to understand how food molecules are supplied to cells.

Subject: Science – Year 8

Year 8	Autumn 1	Autumn 2	Spring 1	Spring 2	Summer 1	Summer 2
Topic and *investigation project*	**Chemical reactions** *How can acidic soil be neutralised with a base?*	**Gas exchange and respiration** *Which substrate gives the fastest rate of respiration in yeast?*	**Electricity and magnetism** *How can we make a stronger electromagnet?*	**Earth and atmosphere** *What effect does heating time have on weathering of desert rocks?*	**Waves** *Which factors affect the time that an after-image appears on the retina?*	**Ecology** *How do species interact in a hedgerow habitat?*
Skills	Make measurements and use appropriate techniques and apparatus. Draw tables and graphs. Use observations and data to draw conclusions. Evaluate the reliability of methods and Evaluate data, identifying random and systematic error.	Make measurements and use appropriate techniques and apparatus. Draw tables and graphs. Use observations and data to draw conclusions. Evaluate the reliability of methods and Evaluate data, identifying random and systematic error.	Plan an investigation, identifying variables and making a prediction. Evaluate risks.	Plan an investigation, identifying variables and making a prediction. Evaluate risks.	Consider accuracy, precision, repeatability and reproducibility. Plan an investigation, identifying variables and making a prediction. Evaluate risks. Draw tables and graphs. Use observations and data to draw conclusions. Evaluate data.	Use appropriate apparatus during fieldwork. Apply sampling techniques.
Knowledge	Chemical reactions involve the rearrangement of atoms. Using formulae and equations to represent chemical reactions. Combustion, thermal decomposition, oxidation, displacement and neutralisation reactions. Indicators and the pH scale. Reactions of acids with metals and alkalis. The role of catalysts.	Adaptations of gas exchange structures to their functions. Mechanism of breathing. Measurements of lung volume. Impact of exercise, asthma and smoking on the gas exchange system. Aerobic and anaerobic respiration in living organisms, including fermentation.	Electric current in series and parallel circuits. Potential difference. Resistance as the ratio of potential difference to current. Static electricity and electric fields. Magnetic poles and fields. Earth's magnetism and navigation The magnetic effect of a current in electromagnets and motors.	The composition and structure of the Earth. The rock cycle and formation of igneous, sedimentary and metamorphic rocks. The carbon cycle. The composition of the atmosphere. Limited resources and pollution.	Waves on water are transverse, can reflect, add and cancel. Sound waves are longitudinal, produced by vibrations, need a medium to travel, can reflect and be absorbed and are detected by the ear and a microphone. Auditory range of humans and animals. The use of ultrasound. Light waves are transverse, can travel through a vacuum, can be absorbed, scattered and reflected. Use the model of light rays to explain imaging, reflection and refraction. Light is detected by cameras and the eye.	The interdependence of organisms in an ecosystem. Food webs. The importance of plant reproduction through insect pollination in human food security. How organisms affect, and are affected by, their environment. Bioaccumulation of toxic materials.

					Different frequencies of light are refracted, absorbed and reflected differently.	
Key Vocabulary/reading opportunities	Writing word equations to represent the changes occurring in chemical reactions.	Comprehension exercises: What's in your cells? Oxygen exchange.	Comprehension exercises: Charge it! Magnetic attraction	Comprehension exercises: Atmospheric layers. Climate change.	Comprehension exercises: Pitch and volume. Waves and current. What causes reflections? They see with their ears.	Ecology: taking care of Earth. Competing for resources. Ecosystems. Taiga ecosystems. Rainforest ecosystems. What's eating you? Pesticides – benefit or disaster?
Stretch and Challenge	Show how atoms rearrange during chemical reactions and write symbol equations.	Explain how the human circulatory, digestive and gas exchange systems work together to keep cells alive.	Use ideas about the structure of an atom to explain static charge, current and resistance.	Link processes that add and remove carbon dioxide from the atmosphere to understand changes in the overall levels.	Compare the properties of sound, light and water waves.	Group role play of interdependence in ecosystems.
Links to Modern Britain	Rule of law: agreed ways of representing chemical reactions as word equations and symbol equations.	Rule of law: how national laws are used to promote healthy living, e.g. smoking laws.	Democracy: joint decision making to solve circuit problems in groups.	Rule of law: how do national laws and international treaties contribute to reducing carbon emissions?	Rule of law: follow standard procedures during experiments.	Individual liberty: understanding our impact on the environment and our responsibility to conserve the environment.
Gatsby links	Careers video: pharmacist.	Careers video: nursing.	Electrician careers video.	Chemistry of the atmosphere video.	Lighting technician careers video.	Read about being an ecologist.
Science lessons focus on learning towards understanding a Big Idea. Hinterland Knowledge is how we use activities to give the context to what the students are learning.	**During a chemical reaction, atoms are rearranged forming new substances.** New substances are observed when carrying out chemical reactions in solution, combustion, oxidation, thermal decomposition and neutralisation.	**Organisms must stay in good health to survive and thrive.** Use dissection and microscope slides to investigate the anatomy of the breathing system. Measure lung capacity, peak flow and breathing rate to understand the healthy breathing system.	**Understanding electricity and magnetism helps us develop technology to improve lives.** Use electric circuits, magnets and simulations to learn about how real-life circuits work.	**The Earth's crust is constantly changing as new rocks are formed and older rock is worn away.** Grow crystals to see the effect of temperature, model fossil formation, look at different rock types, investigate the weathering of rocks.	**Waves radiate information. Understanding waves helps us to communicate.** Use ray boxes to investigate reflection, refraction and dispersion. Make a pin-hole camera to investigate images. Use models to compare longitudinal and transverse waves.	**All organisms, including humans, depend on, interact with and affect the environments in which they live and other organisms that live there.** Organisms are observed in hedgerows and other school habitats. Changes in ecosystems are modelled to observe the effects.