Science - Learning Journey

	Science Y7	Baseline Position								
Topic	ELEMENT	Step								
		1	2	3	4	5	6	7	8	9
Current, Voltage & Resistance	Recall examples of conductors and insulators.									
	Draw a simple circuit diagram using circuit symbols.									
	Measure current and voltage in series circuits.									
	Draw a resistor in a circuit diagram.									
	Calculate total resistance in a series circuit.									
	State which charges attract/repel.									
	Apply your understanding of materials to an investigation, using the idea of variables.									
	Identify how to measure current and voltage.									
	Describe patterns of voltage and current in series circuits.									
	Measure current and voltage in parallel circuits.									
	Describe patterns of voltage and current in parallel circuits.									
	Use the units of current, voltage and resistance.									
	Apply the Ohm's law equation to calculate resistance.									
	Describe what causes static electricity.									
	Analyse conclusions from an investigation.									
	Explain what is meant by 'current'.									
	Compare rules of current and voltage in series and parallel circuits.									
	Rearrange the Ohm's law equation.									
	Explain how objects become charged and how this affects surrounding objects.									
	Explain why metals are good conductors.									
	Apply your knowledge to draw more complex circuits.									
	Predict rules in parallel circuits.									
	Analyse the advantages of series and parallel circuits for particular uses.									
	Formulate conclusions using results from an investigation.									
Speed	I can identify the overall resultant force on an object.									
	I can identify which object is moving faster.									
	I can describe a basic method for an investigation.									
	I can identify changes in motion on a distance-time graph.									
	I can calculate speed using the speed equation.									
	I can describe an object's motion when forces are unbalanced.									
	I can describe a detailed method for an investigation and name the variables.									

	I can present data on an appropriate graph.									
	I can describe a journey represented as a distance-time graph.									
	I can draw conclusions from investigation results.									
	I can calculate speed from a d-t graph.									
	I can link my understanding of forces to speed and acceleration.									
	I can rearrange the speed equation and use the correct units.									
	I can discuss the idea of relative motion.									
	I can draw conclusions on the resultant force and movement of a flying object.									
	I can evaluate an investigation and suggest improvements.									
	I can examine distance-time graphs and how a curved line represents acceleration.									
	I can construct a distance-time graph for a given journey with changing speed.									
Gravity	I can identify contact and non-contact forces.									
	I can name 5 different forces and state examples of where they act.									
	I can state the effect gravity has on objects.									
	I can define mass and weight.									
	I can state the variables in an investigation.									
	I can use a bar chart to present results.									
	I can explain how forces affect falling objects.									
	I can describe the effect of gravity in our solar system.									
	I can calculate weight using the formula W = m x g									
	I can describe a detailed method for an investigation.									
	I can suggest explanations for observations on gravity and air resistance.									
	I can compare weight on different planets, using the correct units.									
	I can draw conclusions from experimental results.									
	I can use a line graph to present results.									
	I can explain unfamiliar observations where weight changes.									
	I can evaluate an investigation and suggest improvements.									
	I can evaluate data on mass and gravitational field strength.									
Energy Transfers & Costs	I can recall the names of the 9 energy forms.									
	I can state the input and output energy forms of electrical appliances.									
	I can state how energy is wasted by appliances.									
	I can recall the names of the 3 fossil fuels.									
	I can state 3 examples of renewable energy resources.									

	I can state that electricity costs are based on the usage (energy transferred).									
	I can describe examples of where each energy form is found.									
	I can calculate the useful energy and the amount dissipated, given values of input/output.									
	I can calculate change in temperature and record results in a table.									
	I can draw simple diagrams to show how energy is transferred between energy stores.									
	I can describe what is meant by “renewable” and “non-renewable”.									
	I can describe the pros and cons of fossil fuels.									
	I can calculate the cost of using electrical appliances.									
	I can explain how energy can be stored.									
	I can explain the law of conservation of energy.									
	I can compare the amounts of energy in different foods using food labels and practical results.									
	I can represent energy transfers as Sankey diagrams.									
	I can describe the pros and cons of 5 renewable resources.									
	I can compare the running costs of electrical appliances.									
	I can explain why processes such as swinging pendulums or bouncing balls cannot practically go on forever.									
	I can link concepts to the idea of efficiency.									
	I can evaluate the social, economic and environmental consequences of using renewable and non-renewable resources.									
Light	State how light travels.									
	Draw a simple ray diagram.									
	Recognise refraction from an image or diagram.									
	State that different colours of light have different frequencies.									
	Define the key terms opaque, translucent and transparent									
	Plan an investigation into the way light travels.									
	Label the parts of a ray diagram.									
	Describe how objects appear different colours.									
	Describe the speed and nature of light									
	Describe the rule linking the angle of incidence and the angle of reflection.									
	Explain why refraction happens.									
	Explain how white light splits into different colours.									
	Apply your understanding to explain how a device with multiple mirrors works.									

	Explain refraction in terms of density.									
	Explain observations where coloured lights are mixed or objects are viewed in different lights.									
Sound	State what a vacuum is.									
	Identify which sound is louder/more high-pitched from a diagram.									
	State the variables in an investigation.									
	Define the term echo.									
	Describe how sound travels.									
	Identify the amplitude and wavelength on a wave.									
	Describe a detailed method for an investigation.									
	Make a model of the ear.									
	Explain why sound travels faster in some media compared to others.									
	Use diagrams to compare the waveforms a musical instrument makes when playing different pitches or volumes.									
	Use a line graph to present results.									
	Draw conclusions from experimental results.									
	Describe how sound is detected.									
	Analyse data on sound.									
	Suggest whether data is qualitative or quantitative.									
	Explain how sound travels using the idea of a longitudinal wave.									
Atoms & Elements	State that everything is made of atoms.									
	Identify elements and compounds.									
	Recognise elements and compounds from diagrams.									
	State what the periodic table shows.									
	Use the periodic table to find the name of elements from their symbols.									
	Define the terms ‘atom’ and ‘element’.									
	State the chemical formula of simple compounds.									
	Identify elements, compounds and mixtures.									
	Identify different sections of the periodic table, including groups and periods.									
	Apply knowledge of the periodic table to find metals and non-metals.									
	Describe the composition of a compound using its chemical formula.									
	Define the terms element, compound and mixture.									
	Describe why Mendeleev left gaps in the Periodic Table.									
	Describe trends in reactivity as you move down groups of the periodic table.									
	Apply your understanding to work out a compound’s chemical formula from its name.									
	Link understanding to chemical formulae.									
	Display data on a graph to show trends in physical properties.									

	Interpret experimental results to draw conclusions about reactivity.									
	Apply your understanding of elements and compounds to write word equations.									
Metals & Non-Metals	State 5 properties of metals.									
	Recall the meaning of oxidation.									
	Identify signs that a reaction is taking place.									
	State that some metals are more reactive than others and how we know this.									
	Describe key terms associated with metals and non-metals.									
	Describe oxidation and how to prevent it.									
	Describe reactions using word equations.									
	Assess risks.									
	Describe how metals in compounds can be displaced by other metals.									
	Link the properties of metals to their uses.									
	Describe reactions using symbol equations.									
	Predict the products of chemical reactions using the reactivity series.									
	Explain why metals are able to conduct electricity.									
	Balance symbol equations.									
Acids & Alkalis	Safely identify acids and alkalis using an indicator.									
	State the pH of a substance using the pH scale.									
	Identify variables and carry out an investigation.									
	Describe how to identify acids and alkalis using an indicator.									
	Describe substances' pH based on experimental observations.									
	Collect data and present it using an appropriate graph.									
	Explain the need for safe handling of acids and alkalis, using key terms.									
	Explain whether substances are weak/strong acids or alkalis using pH values.									
	Draw conclusions from results.									
	Evaluate an investigation.									
	Evaluate the limitations of different indicators.									
	Apply new knowledge to unfamiliar information.									
Earth & Universe	Recall the names of Earth's layers.									
	Describe weathering and erosion.									
	Recall the names of different rock types.									
	Recall the length of a day, month and year.									
	Recall the names of the eight planets.									
	Recall the relative sizes of planets, stars, galaxies and the universe.									
	Describe the structure of the Earth.									
	Describe how sedimentary, metamorphic and igneous rocks are formed.									
	Describe why we have day and night.									

	Describe the Solar System in terms of planets, orbits, moons and other objects.									
	Describe what the Universe consists of.									
	Link understanding of Earth's structure to geothermal energy.									
	Link your understanding of sedimentary rock formation to explain how fossils are formed.									
	Compare different rocks' formation and appearance.									
	Explain how different rocks types are interlinked by the rock cycle.									
	Describe an orbit and link the length of an orbit to days, months and years.									
	Explain how scientists draw conclusions about space.									
	Explain what is meant by a light year.									
	Explain rock formation in detail using key words.									
	Create a detailed diagram of the rock cycle using key words.									
	Apply your understanding to explain why the Earth has seasons.									
	Construct a line graph using data about space and use it to extrapolate data.									
	Explain the timeline of the Universe and its potential future.									
Cells & Organisation	Label an animal and plant cell.									
	Recall the names of some specialised cells.									
	Recognise tissues and organs from diagrams.									
	State why we need a skeleton.									
	State why we need muscles.									
	State the role of the nucleus, cell membrane, cytoplasm and mitochondria.									
	State the role of the cell wall, chloroplasts and vacuole.									
	Define the term "specialised cell" and give examples.									
	Define the terms tissue, organ and organ system.									
	Define the terms joint, cartilage and bone marrow.									
	Define the terms ligament and tendon.									
	Explain the terms unicellular and multicellular, giving examples.									
	Use a light microscope to observe and draw cells.									
	Explain how the special features of cells are useful.									
	Explain why multi-cellular organisms need organ systems to keep their cells alive.									
	Explain how a physical property of part of the skeleton relates to its function.									
	Explain how muscles work in an antagonistic pair.									
	Compare plant and animal cell structure.									
	Link the structure of specialised cells to their function using detail and key words									

	Predict what kind of tissue or organ a cell is part of, based on its features.									
	Explain why some organs contain involuntary muscle tissue.									
Variation & Inheritance	State some examples of variation.									
	Draw a bar chart.									
	Recall that genetic traits are passed on by parents.									
	Identify points as advantages or disadvantages.									
	Identify whether characteristics are inherited, environmental or both.									
	Identify discontinuous data and select which graph to use for it.									
	Describe what happens during fertilisation.									
	Describe chromosomes, DNA and genes.									
	Describe what is meant by 'genetic modification'.									
	Explain how individuals differ within and between species.									
	Identify continuous data and plot it as a line graph.									
	Explain why identical twins look similar but are not usually completely identical.									
	Explain the part played by Watson, Crick, Wilkins and Franklin in the development of the DNA model.									
	Suggest arguments for and against genetic modification.									
	Suggest how variation can help some individuals survive better than others.									
	Critique a claim that a particular characteristic is inherited or environmental.									
	Explain the difference between continuous and discontinuous data.									
	Explain inheritance in terms of gametes, chromosomes, alleles and DNA.									
	Suggest benefits from scientists knowing all the genes in the human genome.									
Human Reproduction	State changes that occur during puberty.									
	Recognise key parts of the male and female reproductive systems.									
	Label diagrams of the male and female reproductive systems.									
	Order key stages of the menstrual cycle.									
	Describe the male and female gametes.									
	Label features that support a foetus during pregnancy.									
	Define contraception.									
	Identify which changes happen in boys, girls and both.									
	Describe key stages of the menstrual cycle.									
	Describe fertilisation.									
	Describe the role of the placenta.									
	Describe 5 methods of contraception.									
	Explain why each change in puberty happens.									

	Describe the role of each part of the male and female reproductive systems.									
	Explain each stage of the menstrual cycle, linking this to fertilisation.									
	Explain what happens at each stage of fertilisation.									
	Explain stages of development in the uterus and how a foetus is reliant on its mother.									
	Compare types of contraception and their suitability for certain people.									
	Describe causes of low fertility in male and female reproductive systems.									
	Explain why pregnancy is more or less likely at certain stages of the menstrual cycle.									
	Suggest what factors might affect fertility.									
	Predict the effect of a mother taking cigarettes, alcohol or drugs on the developing foetus.									
	Make deductions about how contraception and fertility treatments work.									
Interdependence	Describe an ecosystem.									
	Identify the order of a food chain.									
	Identify predators and prey in a food web.									
	State the role of pesticides.									
	Discuss features of an ecosystem including the environment and populations living there.									
	Describe feeding relationships using key words.									
	Describe how a species' population changes as its predator or prey population changes.									
	Describe the differences between chemical and biological control of pests.									
	Suggest what affects populations and how this affects ecosystems.									
	Interpret food webs.									
	Explain why the population of a species is affected by the number of its predators and prey.									
	Discuss the effects of toxic materials on populations.									
	Suggest what might happen when an unfamiliar species is introduced into a food web.									
	Suggest what caused a change in the population of a species, based on data.									
	Evaluate the impact of humans on other organisms with reference to accumulation of toxic materials.									