Riverside Meadows Academy – KS3 Science Descriptors

Subject Strands	**AF1**- How Science Works	**AF2** – Organisms, their behaviour and the environment	**AF3** – Materials, their properties and the earth	**AF4** – Energy, forces and space
National Curriculum Level 1	• Pupils respond to prompts to suggest practical ways to find answers to questions. They make observations about features of objects, living things and events. • They communicate their findings in ways such as talking about their work in everyday terms, or through drawings or by completing pictograms	• Pupils use their knowledge related to organisms, their behaviour and the environment to recognise, identify and describe a range of common plants, animals and natural events. • They name and describe external parts or features of plants, such as leaf colour; humans, such as head, arm; and other animals, such as coat colour. • They use that evidence to identify plants or animals and make links between science and everyday objects and experiences	• Pupils use their knowledge related to materials, their properties and the Earth, to recognise, and describe some common materials, and their sensory properties, such as the texture and appearance of soils. • They communicate their descriptions and observations in terms of these properties. • They recognise evidence that has been used to answer a question such as identifying similar materials and make links between science and everyday objects and experiences such as waterproof materials being used to keep things dry	• Pupils use their knowledge related to energy, forces and space to describe some changes in light, sound or movement, that result from actions, such as those caused by pushing and pulling objects or switching on an electrical circuit. They recognise that light and sound come from a variety of sources, such as the Sun or a musical instrument. • They recognise evidence that has been used to answer a question, such as how a musical instrument makes a noise, and make links between science and everyday objects and experiences such as the Sun being a light source.
National Curriculum Level 2	• Pupils respond to suggestions and make their own suggestions, with help, about how to collect relevant data and answer questions. • They find information by using texts, with help. • They follow direct instructions in order to stay safe. • They make observations and measurements to compare living things, objects and events, using equipment provided for them. • They record findings using prepared tables and communicate observations using scientific vocabulary.	• Pupils use their knowledge related to organisms, their behaviour and the environment to describe plants and animals, the places they are found and the basic conditions they need in order to survive. • They recognise and describe similarities and differences between the plants, humans and other animals they observe, using these to sort them into groups. • They use questions based on their own ideas and evidence such as finding different types of plants and animals in different places.	• Pupils use their knowledge related to materials, their properties and the Earth to identify a range of common materials and some of their properties. • They recognise, and describe similarities and differences between the materials they observe, using these to sort them into groups. • They recognise and describe ways in which some materials are changed by heating or cooling or by processes such as bending or stretching. • They suggest answers to questions, such as the best material to reflect	• Pupils use their knowledge related to energy, forces and space to recognise, describe and compare a range of properties and effects of light, sound, forces, and electricity, such as the ways in which devices work in different electrical circuits, the brightness or colour of lights, the loudness of sounds or the speed or direction of different objects. • They suggest answers to questions such as which sound is loudest based on their own ideas and evidence. • They identify science in everyday contexts and say whether it is helpful, for example electricity in domestic appliances

	• They say whether what happened was what they expected and, when prompted, suggest different ways they could have done things	• They identify science in everyday contexts and say whether it is helpful, for example ways of growing vegetables for food	light, based on their own ideas and evidence. • They identify science in everyday contexts and say whether it is helpful, for example ice melting.	
National Curriculum Level 3	• Respond to suggestions and put forward their own ideas about how to investigate an idea or find answers to questions. • Recognise why it is important to collect data to investigate ideas and answer questions, and use texts to find information. • Recognise risks with help. • Make relevant observations and measure quantities, such as length or mass, selecting and using a range of simple equipment. • Carry out fair tests with some help, recognising and explaining what makes them fair. • Record findings in a variety of ways, including tables or charts. • Give explanations for observations and for patterns in measurements they have made and recorded. • Communicate in a scientific way what they have found out and suggest improvements in their work.	• Use knowledge and understanding of organisms, their behaviour and the environment, such as the basic life processes of growth and reproduction, to describe similarities, differences and changes in the plants, animals, and non-living things they observe. • Use simple scientific ideas with evidence they have collected to give explanations of your observations, linking cause and effect, for example lack of light or water affecting plant growth and the ways in which animals or plants are suited to their environments. • Recognise and explain the purpose of a variety of scientific and technological developments in their everyday lives, for example medicines helping people get better when they are ill.	• Use knowledge and understanding of materials, their properties and the Earth to sort materials into groups in a variety of ways, according to their properties. • Explain the ways in which some materials are suited to specific purposes such as glass for windows or copper for electrical cables. • Classify changes in materials as reversible, such as water freezing, and non-reversible, such as baking of cakes. • Use simple scientific ideas with evidence they have collected to give explanations of their observations, linking cause and effect, for example the evaporation of water. • Recognise and explain the purpose of a variety of scientific and technological developments in their everyday lives, for example sustainable packaging.	• Use their knowledge and understanding of energy, forces and space to link cause and effect in their observations of the properties and effects of light, sound, forces, and electricity, such as a bulb failing to light because of a break in an electrical circuit, or a push or pull changing the speed or direction of a moving object. • Begin to make generalisations such as sounds getting fainter the further the listener is from the source. They use simple scientific ideas with evidence they have collected to give explanations of their observations, linking cause and effect, for example using a switch to turn off a light bulb in an electrical circuit. • Recognise and explain the purpose of a variety of scientific and technological developments in their everyday lives, for example streamlining and air resistance.

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National Curriculum Level 4	• Decide on an appropriate approach, including using a fair test to answer a question, and select suitable equipment and information from that provided. • Select and use methods that are adequate for the task. • Following instructions, you take action to control obvious risks to themselves. • Make a series of observations and measurements and vary one factor while keeping others the same. • Record their observations, comparisons and measurements using tables and bar charts and begin to plot points to form simple graphs. • Interpret data containing positive and negative numbers. • Begin to relate their conclusions to patterns in data, including graphs, and to scientific knowledge and understanding. • Communicate their conclusions using appropriate scientific language. • Suggest improvements in their work, giving reasons.	• Describe some processes and phenomena related to organisms, their behaviour and the environment, drawing on scientific knowledge and understanding and using appropriate terminology, for example using food chains to describe feeding relationships between plants and animals in a habitat. • Recognise that evidence can support or refute scientific ideas, such as in the identification and grouping of living things. • Recognise some applications and implications of science, such as the use of predators to control pest populations.	• Describe some processes and phenomena related to materials, their properties and the Earth, drawing on scientific knowledge and understanding and using appropriate terminology, for example separation methods. • Recognise that evidence can support or refute scientific ideas, such as the classification of reactions as reversible and irreversible. • Recognise some applications and implications of science, such as the safe use of acids and alkalis.	• Describe some processes and phenomena related to energy, forces and space, drawing on scientific knowledge and understanding and using appropriate terminology, for example the observed position of the sun in the sky over the course of a day. • Recognise that evidence can support or refute scientific ideas, such as sounds being heard through a variety of materials. • Recognise some applications and implications of science, such as the use of electrical components to make electrical devices.

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National Curriculum Level 5	• Decide appropriate approaches to a range of tasks, including selecting sources of information and apparatus. • Select and use methods to obtain data systematically. • Recognise hazard symbols and make, and act on, simple suggestions to control obvious risks to themselves and others. • Use line graphs to present data, interpret numerical data and draw conclusions from them. • Analyse findings to draw scientific conclusions that are consistent with the evidence. • Communicate these using scientific and mathematical conventions and terminology. • Evaluate their working methods to make practical suggestions for improvements.	• Describe processes and phenomena related to organisms, their behaviour and the environment, drawing on abstract ideas and using appropriate terminology, for example the main functions of plant and animal organs and how these functions are essential. • Explain processes and phenomena, in more than one step or using a model, such as the main stages of the life cycles of humans and flowering plants. • Apply and use knowledge and understanding in familiar contexts, such as different organisms being found in different habitats because of differences in environmental factors. • Recognise that both evidence and creative thinking contribute to the development of scientific ideas, such as the classification of living things. • Describe applications and implications of science, such as solving some of the health problems that arise when organ damage occurs.	• Describe processes and phenomena related to materials, their properties and the Earth, drawing on abstract ideas and using appropriate terminology, for example the weathering of rocks. • Explain processes and phenomena, in more than one step or using a model, such as the deposition of sediments and their formation into rocks. • Apply and use knowledge and understanding in familiar contexts, such as identifying changes of state. • Recognise that both evidence and creative thinking contribute to the development of scientific ideas, such as basing separation methods for mixtures on physical and chemical properties. • Describe applications and implications of science, such as the uses of metals based on their specific properties or the benefits and drawbacks of the use of fossil fuels.	• Describe processes and phenomena related to energy, forces and space, drawing on abstract ideas and using appropriate terminology, for example 'balanced forces'. • Explain processes and phenomena, in more than one step or using a model, such as the length of a day or a year. • Apply and use knowledge and understanding in familiar contexts. • Recognise that both evidence and creative thinking contribute to the development of scientific ideas, such as objects being seen when light from them enters the eye. • Describe applications and implications of science, such as the ways sound can be produced and controlled, for example in musical instruments.

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National Curriculum Level 6	• Identify an appropriate approach in investigatory work, selecting and using sources of information, scientific knowledge and understanding. • Select and use methods to collect adequate data for the task, measuring with precision, using instruments with fine scale divisions, and identify the need to repeat measurements and observations. • Recognise a range of familiar risks and take action to control them. • Record data and features effectively, choosing scales for graphs and diagrams. • Analyse findings to draw conclusions that are consistent with the evidence and use scientific knowledge and understanding to explain them and account for any inconsistencies in the evidence. • Manipulate numerical data to make valid comparisons and draw valid conclusions. • Communicate qualitative and quantitative data effectively, using scientific conventions and terminology. • Evaluate evidence, making reasoned suggestions about how their working methods could be improved.	• Describe processes and phenomena related to organisms, their behaviour and the environment, using abstract ideas and appropriate terminology, for example simple cell structure and function. • Take account of a number of factors or use abstract ideas or models in their explanations of processes and phenomena, such as environmental factors affecting the distribution of organisms in habitats. • Apply and use knowledge and understanding in unfamiliar contexts, such as a food web in a habitat. • Describe some evidence for some accepted scientific ideas, such as the causes of variation between living things. • Explain the importance of some applications and implications of science, such as the use of selective breeding.	• Describe processes and phenomena related to materials, their properties and the Earth, using abstract ideas and appropriate terminology, for example the particle model applied to solids, liquids and gases. • Take account of a number of factors or use abstract ideas or models in their explanations of processes and phenomena, such as word equations. • Apply and use knowledge and understanding in unfamiliar contexts, such as relating changes of state to energy transfers in a range of contexts such as the formation of igneous rocks. • Describe some evidence for some accepted scientific ideas, such as the patterns in the reactions of acids with metals and the reactions of a variety of substances with oxygen. • Explain the importance of some applications and implications of science, such as the production of new materials with specific desirable properties.	• Describe processes and phenomena related to energy, forces and space, using abstract ideas and appropriate terminology, for example electric current as a way of transferring energy. • Take account of a number of factors in their explanations of processes and phenomena, for example in the relative brightness of stars and planets. • Use abstract ideas or models, for example sustainable energy sources and the refraction of light. • Apply and use knowledge and understanding in unfamiliar contexts. • Describe some evidence for some accepted scientific ideas, such as the transfer of energy by light, sound or electricity, and the refraction and dispersion of light. • Explain the importance of some applications and implications of science, such as the responsible use of unsustainable sources of energy.

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National Curriculum Level 7	• Plan appropriate approaches and procedures, by synthesising information from a range of sources and identifying key factors in complex contexts and in which variables cannot readily be controlled. • Select and use methods to obtain reliable data, including making systematic observations and measurements with precision, using a range of apparatus. • Recognise the need for a risk assessment and consult appropriate sources of information, which they follow. Record data in graphs, using lines of best fit. • Analyse findings to draw conclusions that are consistent with the evidence and use scientific knowledge and understanding to explain these conclusions and identify possible limitations in primary and secondary data. • Use quantitative relationships between variables. • Communicate effectively, using a wide range of scientific and technical conventions and terminology, including symbols and flow diagrams. • Consider whether the data they have collected are sufficient for the conclusions they have drawn.	• Describe a wide range of processes and phenomena related to organisms, their behaviour and the environment, using abstract ideas and appropriate terminology and sequencing a number of points, for example respiration and photosynthesis, or pyramids of biomass. • Make links between different areas of science in their explanations. • Apply and use more abstract knowledge and understanding, in a range of contexts, such as inherited and environmental variation. • Explain how evidence supports some accepted scientific ideas, such as the structure and function of cells. • Explain, using abstract ideas where appropriate, the importance of some applications and implications of science, such as the uses of cells in stem cell research.	• Describe a wide range of processes and phenomena related to materials, their properties and the Earth, using abstract ideas and appropriate terminology and sequencing a number of points, for example the rock cycle. • Make links between different areas of science in their explanations, such as between the nature and behaviour of materials and their particles. • Apply and use more abstract knowledge and understanding, in a range of contexts, such as the particle model of matter, and symbols and formulae for elements and compounds. • Explain how evidence supports some accepted scientific ideas, such as the reactivity series of metals. • Explain, using abstract ideas where appropriate, the importance of some applications and implications of science, such as the need to consider the availability of resources, and environmental effects, in the production of energy and materials.	• Describe a wide range of processes and phenomena related to energy, forces and space, using abstract ideas and appropriate terminology and sequencing a number of points, for example how energy is transferred by radiation or by conduction. • Make links between different areas of science in their explanations, such as between electricity and magnetism. • Apply and use more abstract knowledge and understanding in a range of contexts, such as the appearance of objects in different colours of light. • Explain how evidence supports some accepted scientific ideas, such as the role of gravitational attraction in determining the motion of bodies in the solar system. • Explain, using abstract ideas where appropriate, the importance of some applications and implications of science, such as the uses of electromagnets.

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National Curriculum Level 8	• Recognise that different strategies are required to investigate different kinds of scientific questions, and use scientific knowledge and understanding to select an appropriate strategy. • Adapt their approach to practical work to control risk. • Record data that are relevant and sufficiently detailed, and choose methods that will obtain these data with the precision and reliability needed. • Analyse data and begin to explain, and allow for, anomalies. • Carry out multi-step calculations and use compound measures, such as speed, appropriately. • Communicate findings and arguments, showing awareness of a range of views. • Evaluate evidence critically and suggest how inadequacies can be remedied.	• Demonstrate extensive knowledge and understanding related to organisms, their behaviour and the environment. Use and apply this effectively in their descriptions and explanations, identifying links between topics, for example relating cellular structure of organs to their associated life processes. • Interpret, evaluate and synthesise data from a range of sources and in a range of contexts, for example environmental data from fieldwork. • Show they understand the relationship between evidence and scientific ideas, and why scientific ideas may need to be changed, for example the short-term and long-term effects of environmental change on ecosystems. • Describe and explain the importance of a wide range of applications and implications of science, such as relating photosynthesis and respiration to changes in the atmosphere and growth of crops.	• Demonstrate extensive knowledge and understanding related to materials, their properties and the Earth. • Use and apply this effectively in their descriptions and explanations, identifying links between topics, for example relating mode of formation of rocks to their texture and mineral content. • Represent common compounds by chemical formulae and use these formulae to form balanced symbol equations for reactions. • Interpret, evaluate and synthesise data from a range of sources and in a range of contexts, such as describing chemical reactions, classifying them and suggesting how new substances could be made. • Show they understand the relationship between evidence and scientific ideas, and why scientific ideas may need to be changed. • Describe and explain the importance of a wide range of applications and implications of science.	• Demonstrate extensive knowledge and understanding related to energy, forces and space, for example the passage of sound waves through a medium. • Use and apply this effectively in their descriptions and explanations, identifying links between topics. • Interpret, evaluate and synthesise data from a range of sources and in a range of contexts. • Show they understand the relationship between evidence and scientific ideas, and why scientific ideas may need to be changed, such as the developing understanding of the structure of the solar system. • Describe and explain the importance of a wide range of applications and implications of science, such as relating the dissipation of energy during energy transfer to the need to conserve limited energy resources.

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Exceptional Progress	• Recognise that different approaches are required to investigate different kinds of scientific questions, and use scientific knowledge and understanding to select appropriate strategies. • Readily identify hazards, seek appropriate risk assessment information and advice, select that which is relevant and, adjust practice as required. • Make records of relevant observations and comparisons, clearly identifying points of particular significance. • Decide the level of precision needed for measurements and collect data that satisfy these requirements. • Analyse findings to interpret trends and patterns and draw conclusions from their evidence. • Make effective use of a range of quantitative relationships between variables in calculations or when using data to support evidence. • Communicate findings and arguments, showing their awareness of the degree of uncertainty and a range of alternative views. • Evaluate evidence critically and give reasoned accounts of how they could collect additional evidence.	• Demonstrate both breadth and depth of knowledge and understanding of organisms, their behaviour and the environment. • Apply this effectively in their descriptions and explanations, identifying links and patterns within and between topics, for example linking internal and external cell structures to life processes. • Interpret, evaluate and synthesise data, from a range of sources in a range of contexts, and apply their understanding to a wide range of biological systems. • Demonstrate an understanding of how scientific knowledge and understanding changes, building on processes such as questioning, investigating and evidence-gathering, for example in the study of global climate change. • Describe and explain the importance of a wide range of applications and implications of science in familiar and unfamiliar contexts, such as addressing problems arising from global climate change.	• Demonstrate both breadth and depth of knowledge and understanding of materials, their properties and the Earth, for example the different timescales over which rock formation and deformation take place. • Apply this effectively in their descriptions and explanations, identifying links and patterns within and between topics, for example relating the properties of materials to the nature of their constituent particles. • Interpret, evaluate and synthesise data from a range of sources in a range of contexts, and apply their understanding to a wide range of chemical systems, such as explaining chemical behaviours that do not fit expected patterns. • Demonstrate an understanding of how scientific knowledge and understanding changes, building on processes such as questioning, investigating and evidence-gathering. • Describe and explain the importance of a wide range of applications and implications of science in familiar and unfamiliar contexts.	• Demonstrate both breadth and depth of knowledge and understanding of energy, forces and space. • Apply this effectively in their descriptions and explanations, identifying links and patterns within and between topics, for example understanding how models like the particle model are useful in explaining physical phenomena, such as how sweating causes cooling. • Interpret, evaluate and synthesise data from a range of sources in a range of contexts and apply their understanding to a wide range of data on energy efficient physical systems. • Demonstrate an understanding of how scientific knowledge and understanding changes, building on processes such as questioning, investigating and evidence gathering, for example through the role of artificial satellites and probes in communications and space exploration. • Describe and explain the importance of a wide range of applications and implications of science in familiar and unfamiliar contexts, such as alternative methods of electricity generation.