KS3 'Stages of Excellence': Science

	Year 7	Year 8	Year 9
4.Extending	**How Science Works** • I can select key scientific vocabulary and use it appropriately in application to different literacy and comprehension demands • I can reflect upon, and make suggestions to improve, the accuracy and reliability of experimental tasks • I can construct a method and follow it accurately to test a constructed hypothesis • I can describe and explain a range of hazard symbols • I can evaluate and negate risk to follow laboratory safety rules • I can record data accurately and justify choices of presentation • I can accurately construct a range of graphs **Biology** • I construct accurate and labelled diagrams of eukaryotic cells • I can construct diagrams of fungus and bacteria cells • I can explain the difference between a range of examples of tissues, organs and organ systems • I can explain the role of the skeleton, joints, muscles, ligaments and tendons • I can explain what occurs when an antagonistic pair work together • I can apply knowledge of tissues, organs and organ systems to specific cases and contexts • I can apply knowledge of joints, skeleton and movement to novel examples including sports • I can observe cells accurately using a microscope and record observations • I can explain the difference between resolution and magnification • I can describe and explain specific features and functions of unique aspects of a range of specialised cells • I can explain the roles of respiration and photosynthesis and position where they occur within cells • I can explain factors that effect diffusion and predict changes for a range of situations • I can apply knowledge of diffusion and osmosis to a range of contexts • I can explain differences between how and why boys and girls develop differently during puberty • I can explain the function of the reproductive system • I can explain what happens as a foetus grows in the womb • I can explain how plants reproduce • I can explain different ways plants are pollinated and provide appropriate and detailed justifications for these variations to occur due to environmental differences **Chemistry** • I can explain the particulate nature of matter and describe the difference between atoms, elements, compounds, molecules and mixtures • I can explain what is meant by density and calculate it accurately, use correct units and convert units where necessary • I can accurately explain the particle model of the states of matter and the pros and cons of using models to explain concepts that are very small	**How Science Works** • I can select key scientific vocabulary and use it appropriately in application to different literacy and comprehension demands • I can reflect upon, and make suggestions to improve, the accuracy and reliability of experimental tasks • I can construct a method and follow it accurately to test a constructed hypothesis • I can evaluate and negate risk to follow laboratory safety rules • I can record data accurately and justify choices of presentation • I can accurately construct a range of graphs and explain patterns that can be observed **Biology** • I can explain causes of variation in humans including those that are inherited, environmental and have correlation between both categories for example height or weight • I can describe the role and function of DNA, genes and chromosomes • I can collect and plot continuous and discontinuous data accurately and suggest appropriate evaluative actions • I can construct accurate food chains and food webs from a range of novel sources and accurately explain the feeding and energy relationships between members of the diagram • I can explain the role of producers and decomposers in an ecosystem • I can explain how food chains and ecosystems can be disrupted and make predictions about the impacts that could occur • I can explain the dangers of bioaccumulation • I can apply knowledge of diffusion to the functions and adaptions of the lungs • I can apply knowledge of gas pressure to explain what happens when we exhale and inhale • I can explain the role of photosynthesis and make links with producers and food chains • To can explain factors that increase and decrease the rate of photosynthesis • I can explain how the body uses aerobic and anaerobic respiration • I can apply knowledge to explain the uses of fermentation **Chemistry** • I can explain differences in the composition and structure of the layers of planet Earth • I can explain which gases are or are not cycled through the atmosphere and apply knowledge of photosynthesis and respiration • I can accurately predict properties of different elements and compounds based upon their structure and position on the periodic table • I can accurately determine the outcome of a range of chemical reactions • I can explain what happens during displacement reactions involving metals • I can explain what happens during combustion and thermal decomposition • I can explain the Law of Conservation of Mass	**How Science Works** • I can use key scientific vocabulary in explanations that inform a reader why and/or how a concepts applies in the real world using connectives • I can design, follow and evaluate the accuracy, reliability and validity of experimental tasks • I can recognise sources of error • I can account for anomalies in tables, graphs and results sections • I can accurately plot graphs from data and produce a line of best fit to show patterns that can be observed • I can articulate and present novel and self directed information • I can explain the role and purpose of scientific theory • I can explain the role and purpose of scientific evidence **Biology** • I can explain the role of different nutrients in the human body and how we can maintain a healthy and balanced diet • I can justify choices and suggestions for a healthy diet for a range of people of different ages, sexes and occupations • I can suggest treatments and prevention for a range of deficiency disease • I can accurately test for food nutrients and construct a detailed methodology • I can explain the structure and function of enzymes as a biological catalyst in different parts of the digestive system • I can explain the function and features of specialised cells and tissues in the stomach and intestines • I can explain how surface area to volume ratio affects the rate of diffusion in the villi **Chemistry** • I can explain the correlations and causations that link human activity, natural cycles and climate change • I can explain the environmental and economic advantages and disadvantages of recycling non renewable materials • I can explain the fundamental nature of matter and how it forms different materials with specific properties • I can explain the different types of bonding that form some generic and unique structures and use these to determine their properties • I can explain how to separate a range of solid, liquid and gas mixtures • I can explain how the law of conservation of mass and how the law of conservation of energy affect chemical reactions • I can accurately complete chemical equations based upon knowledge of reactivity • I can accurately use the periodic table to extract information **Physics** • I can explain the order, scale and magnitude of objects in the universe and how they interact with each other • I can explain natural phenomena through cause and effect such as eclipse and seasons • I can explain how contact and non-contact forces interact with objects and fields • I can resolve resultant forces • I explain how gas pressure is effected by the rate of collision and energy of collisions on surface

	• I can explain what happens in terms of energy, vibrations, bonds and forces when matter changes state • I can explain what occurs during boiling and use melting points and boiling points to predict states of matter • I can explain what occurs during diffusion and apply knowledge to real world examples • I can explain how temperature, pressure, particle size and state affect the rate of diffusion and why • I can explain how pressure is determined by gas behaviour and energy • I can explain what occurs during diffusion • I can explain a solubility curve • I can explain specific separation techniques based upon properties and usefulness • I can explain the process, uses and applications of chromatography and distillation • I can explain what occurs during chemical and physical reactions • I can explain the properties and how to test for acids and alkalis • I can use knowledge of acids and alkalis to acutely determines products of specific reactants • I can explain the difference between the concentration of acid and the strength of acid • I can accurately use indicators to predict and determine pH • I can accurately follow a method to produce pure salt crystal **Physics** • I can explain and give examples of energy stores and how energy is transferred between stores in specific scenarios • I can explain the advantages and disadvantages of renewable and non-renewable power and evaluate data and information relating to their uses and effects • I can calculate energy, power and energy bills • I can apply knowledge of the law of conservation of energy to everyday scenarios and practical tasks • I can explain how contact and non-contact forces affect objects and calculate resultant force • I can predict the outcome of actions and resolved forces that are balanced or unbalanced • I can calculate speed • I can construct and interpret distance time graphs • I can calculate acceleration from number and graph data • I can explain how some forces are fields and how they affect different objects at distance • I can explain why gravity keeps objects in orbit	• I can explain the difference between exothermic and endothermic reactions in terms of bonds breaking and making. • I can calculate bond energy changes • I can construct and interpret energy level diagrams **Physics** • I can explain how energy is transferred between different energy stored along pathways • To can apply knowledge of energy transfer to novel contexts including appliances and physical activities • To can apply knowledge of energy to suggest ways that we can prevent unwanted energy transfer • To accurately calculate energy and energy efficiency • To explain the difference between longitudinal and transverse waves • To explain how the ears and eyes are adapted to their function and the purpose and role of unique specialised tissues • To explain the dangers of high decibel work and suggest safety devices that protect us based upon knowledge of how energy is absorbed, emitted and transferred through different materials • To explain how light is refracted through different densities and calculate angles • To explain the effects of the addition or subtraction of different light frequencies when using filters	• I can accurately draw a model of pressure inside a balloon or other contained • I can explain how magnetic fields interact • I can explain how energy travels as a longitudinal and transverse waves • I can apply knowledge of density to explain refraction
3.Secure	**How Science Works** • I can construct hypotheses based upon variables • I can use scientific language and literacy to describe and explain scientific phenomena and begin to apply knowledge to novel examples • I can avoid risks and recognise laboratory routines to support myself and lab partners • I can record data on tables and construct bar charts and line graphs **Biology** • I can construct and label accurate diagrams of cells	**How Science Works** • I can use scientific vocabulary to describe key scientific ideas and begin to explain and apply knowledge to novel concepts • I can construct and follow accurate methods for a range of practical activities • I can plot and interpret bar charts and line graphs • I can calculate a mean • I can begin to use substitution to rearrange equations **Biology** • I can describe the shape of DNA • I can identify where DNA is found and describe • I can describe the difference between genes and chromosomes	**How Science Works** • I can use key scientific vocabulary to describe important features or processes • I can follow laboratory safety routines and suggest uses of specialised or digital equipment • I can construct and follow methodologies • I can construct and interpret data using tables and graphs • I can calculate a mean and exclude anomalies • I can evaluate practical activities and suggest ways to improve accuracy and reliability • I can evaluate the role of theory

	• I can describe and explain the function of the cell membrane, ribosomes, nucleus, cell wall, cell membrane, cytoplasm, vacuole, mitochondria and chloroplast • I can explain the relationship between photosynthesis and respiration • I can explain how living organisms benefit from photosynthesis and respiration • I can explain how the skeleton has adaptions to allow for movement and protection of organs • I can describe the functions of specific bones in the body • I can describe and explain the function of moveable and immoveable joints • I can describe and explain the function of an antagonistic pair • I can describe the function of cartilage and synovial fluid • I can explain the adaptions of function of a sperm and egg cell • I can describe what occurs in order for fertilisation to take place • I can describe the stages of pregnancy • I can describe how plants reproduce and spread their seeds **Chemistry** • I can explain the particle model of matter • I can describe the structure of atoms • I can describe the structure of compounds, molecules and mixtures • I can begin to describe isotopes and ions • I can calculate density • I can convert units • I can explain how the behaviour of particles changes as substances undergo state changes • I can explain what occurs during diffusion and describe factors that effect it • I can describe and investigate distillation • I can carry out investigations using chromatography and interpret the results • I can explain what would make acids more or less concentrated • I can describe the risks of strong acids and alkalis • I can accurately use universal indicator **Physics** • I can describe eight energy stores and give examples of each • I can describe how energy is transferred between stores in appliances • I can describe how non-renewable power is generated • I can describe how energy demand varies • I can describe the different forms of renewable energy • I can calculate energy and convert units • I can calculate resultant force • I can plot and interpret distance time graphs	• I can differentiate between and categorise continuous and discontinuous data • I can construct food chains and food webs and describe how energy is transferred between producers and predators • I can describe how energy is lost and/or used during a food web/food chain • I can describe how DDT/Mercury accumulate through food chains and explain how this can pose a risk to people • I can explain some of the negative effects of human behaviour on the environment and a range of ecosystems • I can explain some of the ways that humans try to maintain biodiversity and the reasons for this • I can explain how the lungs are adapted for their function • I can explain where and why respiration takes place in animals • I can explain where and why photo synthesis takes place in plants • I can explain how increasing or decreasing carbon dioxide, water or light can influence the rate of photosynthesis in plants • I can suggest economic and environmental reasons why some farmers do or do not artificially control plant growth **Chemistry** • I can describe the order and structures found inside the planet Earth • I can describe how carbon dioxide and oxygen are cycled through the atmosphere • I can give examples and describe the benefits of Carbon sinks • I can use the periodic table to determines the names and structure of different elements • I can use the periodic table to predict properties of group 1 7 and 0 elements • I can determines the products that are formed during chemical reactions • I can determine and describe if reactions are chemical or physical • I can determine the products of displacement reactions using metals and acids • I can explain why a displacement reaction did or did not happen due to reactivity • I can describe what happens during combustion • I can explain the Law of Conservation of Mass • I can draw and interpret energy profile graphs • I can explain the difference between what happens during an exothermic reaction compared to an endothermic reaction **Physics** • I can give novel examples of each different energy store • I can use description and diagram to show how energy is transferred between stores in everyday objects and appliances • I can describe what happens during dissipation • I can explain the importance of insulation and energy efficiency • I can calculate efficiency • I can draw, label and describe transverse and longitudinal waves • I can explain unique adaptions of the eyes and ears • I can describe the risk of high decibels on the ear • I can investigate reflection and refraction • I can explain why light changes angle during reflection • I can describe the effects of filters on colour	**Biology** • I can explain how the organelles in cells support respiration and/or photosynthesis • I can explain how the stomach, intestines and oesophagus are adapted for their function • I can explain the role and adaptions of the villi • I can explain how lipase, protease and amylase support chemical digestion • I can explain the effect of pH and temperature on the rate of enzyme function • I can evaluate the needs of different people groups e.g. by age or occupation, to suggest changes that should be made to pursue a healthy diet • I can suggest ways to avoid and treat malnourishment • I can observe cells using a microscope and manipulate magnification and resolution • I can explain how gas exchange relies on diffusion and factors that speed up or slow down the process • **Chemistry** • I can identify most of the gases in the atmosphere • I can explain how human activity contributes towards the greenhouse effect • I can explain how increases in the greenhouse effect can cause climate change • I can describe how climate change affects a range of human and non-human species • I can suggest ways that humans can slow down the damage we cause to the environment and atmosphere • I can explain how recycling saves money and resources • I can identify elements from the periodic table and interpret information about properties • I can construct diagrams of elements and their electronic structures • I can explain how to separate liquid mixtures using simple distillation • I can describe what occurs during chromatography **Physics** • I can attempt to resolve some resultant forces • I can explain how opposing forces cause a resultant force • I can explain how mass and area determine force • I can describe why air resistance is a contact force and why magnetism is a non contact force • I can explain how temperature alters gas pressure • I can explain how pressure is determined by collisions • I can describe how magnetic fields interact • I can explain how light and sound waves differ • I can construct a model of longitudinal and transverse waves • I can explain how the eye detects light • I can calculate the angles of incidence and refraction • I can explain how density affects the speed of a wave of light • I can investigate refraction and determine angles • I can describe how lenses effect a wave of light

2.Developing	**How Science Works** • I can identify most standard pieces of laboratory equipment • I can follow and support others to follow laboratory routines and safety guidelines • I can follow an experimental method, however there may be some mistakes in taking measurements • I can record data in tables and reflect on numbers that look like they do not follow the pattern, if there is one. **Biology** • I can identify the function of most parts of a plant and animal cell • I can draw and label a plant and animal cell with very few mistakes • I can identify and begin to describe the function of the skeletal system • I can identify and begin to describe how ligaments, joints and muscles support movement • I can recognise the function and location of some common specialised cells • I can describe the changes that boys and girls experience during puberty • I can describe what happens during fertilisation • I can describe what happens during pregnancy • I can identify the features and functions of a range of tissues that you could find in a plant • I can identify and begin to describe ways that plants pollinate and spread seeds **Chemistry** • I can identify a range of elements and use the periodic table to recognise elements by name or symbol • I can recognise how some elements are similar due to their properties and predict some shared properties of metals and non-metals • I can draw an accurate particle model of solids, liquids and gases • I can use scientific language to describe what happens to particles when they gain or lose energy • I can investigate separating mixtures using chromatography • I can describe what particles do during a range of separation techniques **Physics** • I can use units with a range of measurements • I can resolve some simple resultant forces • I can identify and describe the effects of a range of contact and non-contact forces in new scenarios • I can identify the difference between mass and weight • I can state the effects of gravity in different scenarios • I can calculate weight • I can construct and interpret diagrams of series and parallel circuits • I can investigate patters in voltage and current • I can describe what voltage and current is and their relationship • I can describe how resistance affects current	**How Science Works** • I can use key scientific vocabulary when attempting to *identify* or *describe* important features or processes • I can follow laboratory safety routines and identify important pieces of equipment • I can follow and construct experimental methodologies • I can record data from experiments and begin to recognise anomalies • I can interpret patter • I can suggest simple evaluation points for practical activities • I can recognise some applications and uses of science in the real world **Biology** • I can describe the role of DNA • I can describe some of the genetic variations caused by DNA • I can describe some of the environmental variations between humans • I can begin to sort data into categories or scale • I can collect data using a table and construct bar charts and line graphs • I can identify features of an ecosystem • I can construct food chains from different common and uncommon ecosystems • I can describe the role of a predator and of a producer in a food chain **Chemistry** • I can identify the layers of the Earth • I can describe the difference between properties of the core, mantel and crust • I can identify some of gases that can be found in the atmosphere and describe natural processes that use carbon dioxide and oxygen • I can identify examples of elements and that materials have different properties • I can use the periodic table to identify elements from their name or symbol • I can use the periodic table to identify the mass of difference elements • I can identify metals and non metals from the periodic table • I can identify the difference between a chemical and physical reaction • I can categorise reactions into physical or chemical categories based upon observation • I can begin to construct and predict products from reactants **Physics** • I can identify energy stores • I can give multiple examples of objects that contain a kinetic or chemical or thermal or gravitational potential or elastic potential energy store • I can identify and begin to describe energy transfers between common appliances and every day objects • I can investigate energy using a thermometer • I can describe how sound waves transfer energy • I can describe how different states of matter interact with sound waves • I can describe what happens during an echo • I can describe the function of the ear drum, cochlea and auditory nerve • I can calculate work done	**How Science Works** • I can use key scientific vocabulary when attempting to *identify* or *describe* important features or processes • I can follow laboratory safety routines and identify most standard and some specialised pieces of equipment • I can construct my own methodologies and follow them without many mistakes • I can identify patterns in data and be able to describe what the pattern informs me • I can identify anomalies • I can suggest evaluation points for practical activities **Biology** • I can order cells, tissues, organs and organ systems by size • I can describe the function of the stomach and small intestine • I can describe the features and functions of enzymes and their location in the body • I can describe the function of each type of nutrient and suggest how to balance the diet • I can suggest diets of different nutrients based upon individual needs and differences • I can describe what is meant by theory • I can describe how some organisms have changed due to evolution • I can suggest environmental pressures that could result in evolution • I can observe cells using different objective lenses on a microscope and adjust for resolution • I can describe the function of cell organelles and some specialised cells • I can describe what factors effect diffusion • I can identify some examples of specialised cells • I can identify some places in living things that require diffusion **Chemistry** • I can identify gases in the atmosphere • I can describe how carbon is cycle in and our of living things • I can identify and attempt to describe the role of recycling • I can identify elements and some compounds using the periodic table • I can identify metals and non-metals using the periodic table • I can attempt to suggest separation techniques for different mixtures • I can predict properties of different elements based upon the information from the periodic table • I can describe bonding that occurs between different elements and predict properties **Physics** • I can identify the planets in the solar system and describe some of their differences • I can identify structures in the universe and how the interact with each other • I can describe the effects of some contact and non contact forces • I can attempt to resolve some resultant forces • I can draw a model of pressure inside a balloon and describe how pressure is caused by collisions • I can describe how particles of gas more if they have more or less energy • I can predict the outcome when different magnetic poles meet • I can identify how sound waves travel • I can describe the difference between how sound and light travel • I can describe how the ear detects vibrations • I can accurately model diagrams of transverse and longitudinal waves

1.Novice	**How Science Works** • I can begin to use key scientific vocabulary to make statements about scientific ideas to *identify* important features or processes • I can recognise important laboratory safety routines and pieces of standard equipment • I can follow most stages of a experimental method • I can construct simple hypotheses • I can attempt to record data, some recording may be incomplete or inaccurate **Biology** • I can identify parts of a cell in my work and can identify parts of a cell from a diagram • I can draw the main parts of a plant and animal cell • I can identify how to view cells using a microscope • I can identify some of the jobs of bones • I can identify examples of specialised cells • I can identify some of the changes that happen during puberty • I can identify ways in which boys and girls develop differently • I can identify some of the main features of a plant • I can identify how plants reproduce **Chemistry** • I can identify examples of elements • I can identify that different materials are made of different properties • I can identify that matter can be categorised into solids, liquids and gases and that this results in different properties • I can attempt to draw an accurate model of solids, liquids and gases, and use some important scientific vocabulary when labelling the model • I can identify what happens during chromatography • I can identify that temperature determines a substances state of matter • I can state the difference between filtration, distillation and chromatography **Physics** • I can identify examples of forces • I can identify how forces may affect objects differently • I can begin to distinguish between contact and non-contact forces • I can identify the effects of gravity • I can recognise units that forces are measured in • I can recognise units that speed, distance and time are measured in • I can attempt simple calculations, but may not be able to convert units or use substitution • I can identify most simple circuit symbols • I can identify the features of series and parallel circuits from diagrams • I can identify everyday uses of electricity	**How Science Works** • I can use key scientific vocabulary when attempting to *identify* or *describe* important features or processes • I can follow laboratory safety routines and identify important pieces of equipment • I can follow and construct simple experimental methodologies • I can record data from experiments, but there may be some inaccuracies • I can attempt interpretations of data • I can suggest simple evaluation points for practical activities • I can recognise some applications and uses of science in the real world **Biology** • I can identify the role and function of DNA • I can identify where DNA is found in human cells • I can identify some of the genetic differences between humans • I can identify some of the environmental differences between humans • I can attempt to construct bar charts and line graphs, but there may be errors in plotting and scale • I can identify key features of an ecosystem • I can construct and interpret simple food chains • I can identify producers and consumers from simple food chains **Chemistry** • I can identify the layers of the Earth • I can identify some of gases that can be found in the atmosphere • I can identify examples of elements and that materials have different properties • I can use the periodic table to identify elements from their name or symbol • I can identify metals and non metals from the periodic table • I can identify the difference between a chemical and physical reaction **Physics** • I can identify most energy stores • I can identify some simple energy transfers in common appliances • I can investigate energy using a thermometer • I can use units for energy and temperature • I can identify how sounds are made and how they move through materials • I can identify how sound and different states of matter interact • I can identify some of the features of the ear • I can recognise some information, such as amplitude, from diagrams of waves • I can attempt to calculate energy transfer	**How Science Works** • I can use key scientific vocabulary when attempting to *identify* or *describe* important features or processes • I can follow laboratory safety routines and identify most standard and some specialised pieces of equipment • I can follow and construct simple experimental methodologies • I can identify some patters in data • I can suggest evaluation points for practical activities • I can recognise some applications and uses of biology, chemistry and physics in the real world **Biology** • I can identify that different parts of the body are made from different cells and tissues • I can attempt to identify and describe the functions of the different organs in the digestive system • I can attempt to identify the different digestive enzymes, where they are made and where they do their job • I can identify most nutrient groups and give some examples of each • I can recognise some of the important reasons to have a balanced diet • I can identify the definition of evolution • I can identify some of the roles of scientific theory and evidence • I can draw and label plant and animal cells, there may be some mistakes • I can observe cells using a microscope • I can identify some examples of specialised cells • I can identify some places in living things that require diffusion **Chemistry** • I can identify most of the gases in the atmosphere • I can identify and attempt to describe the role of recycling • I can identify elements and some simple compounds using the periodic table • I can identify most metals and non-metals using the periodic table • I can attempt to suggest separation techniques for different mixtures **Physics** • I can identify the planets in the solar system • I can identify the scale of some of the important features of the universe • I can identify examples of contact and non-contact forces • I can attempt to resolve some resultant forces • I can attempt to identify and describe the effects of some forces on objects • I can attempt to draw a model of pressure inside a balloon • I can identify how particles of gas more if they have more or less energy • I can predict the outcome when different magnetic poles meet • I can give examples of things that travel as a wave • I can attempt to construct diagrams of transverse and longitudinal waves