



# Hillside High School

*Wade Deacon Trust*



## KEY STAGE 3 Y7 - Y9



## ASSESSMENT STEPS



(Science)

“Excellence in the Heart of the Community”

**Key Knowledge Skills and Understanding for Key Stage 3**  
**What do students know and what can they do?**

Key Stage 3 Descriptors  + Excelling - (Projected Grade 9 at GCSE)	<b>Key Knowledge Skills and Understanding for Key Stage 3</b> <b>What do students know and what can they do?</b>			
	Biology	Chemistry	Physics	Scientific skills
	<p><b>Digestion</b></p> <ul style="list-style-type: none"> <li>Justify why some organisms have different energy requirements using data</li> </ul> <p><b>Breathing &amp; Respiration</b></p> <ul style="list-style-type: none"> <li>Evaluate implication for organisms of aerobic and anaerobic respiration based on reactants and products.</li> <li>Evaluate data on the effects of exercise, asthma and smoking.</li> <li>Evaluate the bell-jar model to demonstrate inhalation and exhalation.</li> <li>Evaluate effects of recreational drugs on individuals and a fetus.</li> </ul> <p><b>Plants &amp; Photosynthesis</b></p> <ul style="list-style-type: none"> <li>Discuss factors that could limit rate of photosynthesis.</li> <li>Discuss the importance of limiting factors on economics e.g. farmers producing food.</li> <li>Evaluate whether or not the risk to biodiversity warrants the use of pesticides, fertilisers etc.</li> </ul>	<p><b>Periodic Table/Metals &amp; Non Metals</b></p> <ul style="list-style-type: none"> <li>Link group number and electron structure to explain the patterns of reactivity for Group 1 and Group 7 in the Periodic Table.</li> <li>Analyse data to identify trends in Groups and predict properties of an unknown element.</li> </ul> <p><b>Chemical Reactions</b></p> <ul style="list-style-type: none"> <li>Compare the reactions of different metals when they react with oxygen, water or acids.</li> <li>Explain the changes in energy of an endothermic and exothermic reaction by linking to the energy required to break bonds compared to making bonds.</li> </ul>	<p><b>Electricity</b></p> <ul style="list-style-type: none"> <li>Explain the electrostatic force attraction by the induction of charge.</li> </ul> <p><b>Magnets &amp; Electromagnets</b></p> <ul style="list-style-type: none"> <li>Explain why the geographical north pole of the Earth is actually a magnetic south pole.</li> </ul> <p><b>Heating &amp; Cooling</b></p> <ul style="list-style-type: none"> <li>Suggest why thermal insulators work.</li> <li>Evaluate strategies to reduce energy transfer.</li> <li>Compare the heat capacity of various materials</li> </ul> <p><b>Electricity, Energy Transfer &amp; Cost</b></p> <ul style="list-style-type: none"> <li>Re-arrange an equation to calculate Kinetic, Gravitational Potential and Elastic Potential Energy.</li> </ul> <p><b>Speed &amp; Acceleration</b></p> <ul style="list-style-type: none"> <li>Use gradients from a velocity and distance/time graph to calculate distance or speed.</li> </ul>	<p><b>Method</b></p> <ul style="list-style-type: none"> <li>Make more complex and quantitative predictions using scientific knowledge and understanding. Use this to write a detailed plan, identifying key variables that enables the collection of accurate and reliable data.</li> <li>Explain how control variables will be monitored.</li> </ul> <p><b>Recording results</b></p> <ul style="list-style-type: none"> <li>Create a results table with all appropriate headings.</li> <li>Record data with a high degree of precision and accuracy.</li> </ul> <p><b>Graphs</b></p> <ul style="list-style-type: none"> <li>Independently draw a line graph complete with a suitable linear scale.</li> <li>Extend lines of best fit in order to extrapolate further numerical data.</li> </ul> <p><b>Conclusion and evaluation</b></p> <ul style="list-style-type: none"> <li>Evaluate the reliability of methods in detail.</li> <li>Suggest further questions that may arise from results of investigations and data analysis and evaluation.</li> <li>Compare data from experimental results obtained with other sources.</li> </ul>

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Key Stage 3 Descriptors	Key Knowledge Skills and Understanding for Key Stage 3 What do students know and what can they do?			
	Biology	Chemistry	Physics	Scientific skills
+ - Excelling (Projected Grade 9 at GCSE)	<b>Inheritance &amp; Variation</b> <ul style="list-style-type: none"> <li>Discuss the roles of Watson, Crick, Franklin and Wilkins in discovering DNA's structure.</li> <li>Suggest the importance of predicting inheritance.</li> <li>Evaluate the use of genetic modification.</li> </ul> <b>Evolution</b> <ul style="list-style-type: none"> <li>Evaluate the use of conservation methods in preserving biodiversity.</li> <li>Consider the implications of Darwin's theory of evolution on the accepted theory at the time (creationism).</li> </ul>	<b>Acids &amp; Alkalis</b> <ul style="list-style-type: none"> <li>Describe the difference between concentrated and diluted solutions.</li> </ul> <b>Earths Structure</b> <ul style="list-style-type: none"> <li>Link the formation of rocks together to describe and explain the rock cycle in detail.</li> <li>Compare properties of sedimentary, metamorphic and igneous rock making links to the process by which the rocks were formed.</li> <li>Compare the chemical and physical properties of ceramics.</li> </ul> <b>Climate &amp; Earths Resources</b> <ul style="list-style-type: none"> <li>Discuss the social, environmental and financial implications of high carbon emissions.</li> <li>Evaluate whether global warming is the result of man made or natural cycles of activity.</li> <li>Analyse the advantages and disadvantages of recycling making references to particular schemes e.g. plastic bag charges.</li> </ul>	<b>Work</b> <ul style="list-style-type: none"> <li>Apply knowledge to explain the work done and changes of energy on deformation.</li> </ul> <b>Waves – Light</b> <ul style="list-style-type: none"> <li>Explain refraction with reference to particles and the speed of light.</li> <li>Link the equation for speed, to the application of sound waves.</li> </ul> <b>Universe</b> <ul style="list-style-type: none"> <li>Discuss how models of the universe have changed over time.</li> <li>Justify why theories about the organization of the universe may change again in the future.</li> </ul>	

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	Biology	Chemistry	Physics	Scientific skills
Mastering + - Projected Grades 6 - 8 at GCSE	<p><b>Digestion</b></p> <ul style="list-style-type: none"> <li>Calculate energy requirements of a healthy diet.</li> <li>Explain the role of digestive enzymes and how plants gain their nutrition.</li> <li>Investigate factors that affect enzyme activity.</li> </ul> <p><b>Breathing &amp; Respiration</b></p> <ul style="list-style-type: none"> <li>Compare/contrast aerobic and anaerobic respiration.</li> <li>Describe applications of respiration, such as fermentation and write word equations for both types of respiration.</li> <li>Explain how ventilation occurs with reference to pressure changes and lung volume.</li> <li>Explain adaptations of structures in human gas exchange system.</li> <li>Link adaptations of the human gas exchange system to their functions.</li> </ul>	<p><b>Periodic Table/Metals &amp; Non Metals</b></p> <ul style="list-style-type: none"> <li>Explain patterns between elements in the same group</li> <li>Explain why Mendeleev made the changes he did when developing the modern Periodic Table.</li> <li>Discuss how various scientists contributed to the development of the periodic table.</li> </ul> <p><b>Chemical Reactions</b></p> <ul style="list-style-type: none"> <li>Explain why mass is conserved during changes of state and chemical reactions.</li> <li>Explain how collisions are random and must be successful in order for a reaction to occur.</li> <li>Explain how metals and non-metals react with water, oxygen and acid, using symbol equations where appropriate.</li> <li>Explain the conditions and uses of neutralisation, combustion, thermal decomposition, oxidation, displacement and the reaction of metals and acids.</li> </ul>	<p><b>Electricity</b></p> <ul style="list-style-type: none"> <li>Explain the difference and reason for electrical current and electron flow.</li> <li>Discuss resistance in terms of conductors and insulators.</li> <li>Link conduction and insulation with atomic structure.</li> <li>Suggest applications for materials of higher or lower resistance.</li> <li>Explain static electricity in terms of movement of electrons.</li> <li>Discuss applications of static electricity.</li> </ul> <p><b>Magnets &amp; Electromagnets</b></p> <ul style="list-style-type: none"> <li>Find the shape of a magnetic field.</li> <li>Describe how magnetic induction works.</li> <li>Explain attraction and repulsion in terms of the direction of magnetic field lines.</li> <li>Suggest applications for electromagnets.</li> </ul>	<p><b>Method</b></p> <ul style="list-style-type: none"> <li>Select and apply appropriate sampling techniques.</li> <li>Explain the importance of sampling techniques.</li> <li>Evaluate risks and hazards to plan a safe scientific investigation.</li> <li>Create a detailed and valid method which takes into account key variables and enables the collection of accurate and reliable data.</li> </ul> <p><b>Collecting results</b></p> <ul style="list-style-type: none"> <li>Can accurately make and record observations and measurements using rounding and decimal points.</li> <li>Repeat investigations to calculate a mean.</li> <li>Identify anomalous results and effectively handle anomalous results when calculating means.</li> <li>Explain the importance of units in table headings.</li> </ul> <p><b>Graphs</b></p> <ul style="list-style-type: none"> <li>Independently draw a line of best fit.</li> <li>Identify anomalous data.</li> </ul>

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**Key Knowledge Skills and Understanding for Key Stage 3**  
**What do students know and what can they do?**

+ Mastering  
 - Projected Grades 6 - 8 at GCSE

Biology	Chemistry	Physics	Scientific skills
<p><b>Plants &amp; Photosynthesis</b></p> <ul style="list-style-type: none"> <li>Explain how the structure and organisation of plant tissues is related to its function and how this supports photosynthesis.</li> <li>Explain why life on Earth depends on plants.</li> </ul> <p><b>Inheritance &amp; Variation</b></p> <ul style="list-style-type: none"> <li>Represent variation in graphical form after collecting data.</li> <li>Apply knowledge of genetics to explain the role of gene banks in conservation.</li> <li>Describe the roles of DNA, genes and chromosomes in heredity.</li> <li>Describe the difference between dominant and recessive alleles.</li> <li>Use a Punnet square to predict how genes can be inherited by offspring.</li> <li>Describe how a product can be genetically modified and give examples of such products.</li> </ul>	<p><b>Acids &amp; Alkalis</b></p> <ul style="list-style-type: none"> <li>Explain the agricultural importance of salts.</li> </ul> <p><b>Earths Structure</b></p> <ul style="list-style-type: none"> <li>Explain the factors that may affect the appearance and properties of sedimentary, metamorphic and igneous rocks.</li> <li>Explain how uplift provides evidence of the rock cycle.</li> </ul> <p><b>Climate &amp; Earths Resources</b></p> <ul style="list-style-type: none"> <li>Explain how metals can be obtained from metal oxides using carbon.</li> <li>Discuss the efficacy of recycling.</li> <li>Suggest methods to conserve resources.</li> <li>Consider some environmental, social and financial advantages or disadvantages to recycling.</li> <li>Suggest methods to reduce the level of carbon dioxide in the atmosphere and explain why carbon dioxide reduction is important.</li> <li>Analyse and suggest factors that need to be taken into account when deciding whether extraction of a metal is practical.</li> <li>Use scientific principles to suggest suitability of energy resources.</li> </ul>	<p><b>Heating &amp; Cooling</b></p> <ul style="list-style-type: none"> <li>Explain expansion in terms of particles.</li> <li>Explain radiation in terms of waves and convection, in terms of particles.</li> <li>Explain the effect of temperature on the motion and spacing of particles.</li> </ul> <p><b>Electricity, Energy Transfer &amp; Cost</b></p> <ul style="list-style-type: none"> <li>Calculate electrical power and energy transferred by a device.</li> <li>Calculate the cost of electricity.</li> </ul> <p><b>Speed &amp; Acceleration</b></p> <ul style="list-style-type: none"> <li>Interpret distance-time graphs to calculate speed.</li> <li>Create a distance/time graph.</li> </ul> <p><b>Moments</b></p> <ul style="list-style-type: none"> <li>Explain how simple machines multiply force.</li> <li>Calculate the size of a moment.</li> <li>Explain effects of opposite moments.</li> <li>Re-arrange the moments equation to calculate the force needed to be exerted by e.g. a counterweight.</li> </ul>	<p><b>Conclusion and evaluation</b></p> <ul style="list-style-type: none"> <li>Write reasoned explanations of the conclusion based on the experimental data.</li> <li>Describe how to improve accuracy, precision, repeatability, reproducibility and objectivity.</li> </ul>

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**Key Knowledge Skills and Understanding for Key Stage 3**  
**What do students know and what can they do?**

<p style="writing-mode: vertical-rl; transform: rotate(180deg);"><b>Key Stage 3 Descriptors</b></p> <p style="writing-mode: vertical-rl; transform: rotate(180deg);">+ Mastering + (Projected Grades 6 - 8 at GCSE)</p>	<b>Biology</b>	<b>Chemistry</b>	<b>Physics</b>	<b>Scientific skills</b>
	<p><b>Evolution</b></p> <p>Explain how variation and environmental pressures lead to evolution.</p> <p><b>Cells</b></p> <ul style="list-style-type: none"> <li>Explain why multi-cellular organisms have adapted organ systems to aid diffusion.</li> <li>Compare the structure of eukaryotic and prokaryotic cells.</li> <li>Calculate the magnification or true size of an object using standard form.</li> <li>Suggest factors which affect the rate of diffusion.</li> <li>Explain the adaptations of plant and animal cells, describe diffusion and the function of organelles.</li> <li>Explain the importance of cell differentiation.</li> </ul> <p><b>Movement</b></p> <ul style="list-style-type: none"> <li>Explain how antagonistic muscle pairs bring about movement.</li> <li>Suggest how artificial parts may affect an individual.</li> <li>Describe the role of bone marrow in the production of red blood cells</li> </ul>	<p><b>Atoms, Elements &amp; Compounds</b></p> <ul style="list-style-type: none"> <li>Represent chemical reactions using balanced symbol equations.</li> <li>Explain the differences in properties of different materials with reference to their structure and link uses to their properties.</li> <li>Explain how chemical formulae is determined by the type and number of elements.</li> </ul> <p><b>Particle Model</b></p> <ul style="list-style-type: none"> <li>Explain factors that affect the rate of diffusion.</li> <li>Apply knowledge of physical changes and particles in explaining Brownian motion</li> <li>With reference to particle theory, describe how gases form pressure.</li> <li>Explain how pressure in gases may change.</li> <li>Explain how changes of state relates to the energy of particles using particle diagrams (melting, freezing and boiling).</li> <li>Explain changes of state with reference to the energy of particles</li> <li>Compare solids, liquids and gases with reference to density difference.</li> </ul>	<p><b>Waves – Light</b></p> <ul style="list-style-type: none"> <li>Describe the superposition.</li> <li>Explain why light is a transverse wave.</li> <li>Explain how we see different colours found within white light.</li> <li>Explain dispersion with reference to wave speed.</li> <li>Compare light waves and waves in matter.</li> <li>Explain the effect of filters on coloured light.</li> <li>Describe how pinhole cameras, eyes and convex lenses work.</li> <li>Compare how eyes and cameras process light.</li> <li>Explain how colour blindness occurs, with reference to rod and cones.</li> </ul> <p><b>Waves – Sound</b></p> <ul style="list-style-type: none"> <li>Explain how sound travels with reference to particles.</li> <li>Explain why sound is a longitudinal wave, with reference to the direction of vibrations and energy.</li> <li>Describe how sound waves transfer information if converted to electrical signals.</li> </ul>	

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	<p><b>Human Reproduction</b></p> <ul style="list-style-type: none"> <li>Discuss the impact of maternal lifestyle on fetal development.</li> </ul> <p><b>Plant Reproduction</b></p> <ul style="list-style-type: none"> <li>Discuss the importance of insect pollination to human food security.</li> <li>Explain how plants rely on pollination by wind and insects and the impact a loss of biodiversity would have on a food chain.</li> <li>Explain how seeds are adapted for effective dispersal. Link this to competition from parent plants.</li> </ul> <p><b>Interdependence</b></p> <ul style="list-style-type: none"> <li>Evaluate impact of humans on other organisms, with reference to accumulation of toxic materials.</li> <li>Explain how population sizes affect other populations in terms of competition and predation.</li> <li>Explain how toxic materials can build up within a food chain or web.</li> </ul>	<p><b>Separating Mixtures</b></p> <ul style="list-style-type: none"> <li>Suggest some applications for making substances impure.</li> <li>Identify pure and impure substances from data.</li> <li>Describe dissolving, with reference to particles.</li> <li>Explain how simple techniques for separating mixtures work.</li> </ul>	<p><b>Pressure</b></p> <ul style="list-style-type: none"> <li>Use calculations of density to predict whether an object will float or sink.</li> <li>Explain how pressure in liquids results in upthrust, allowing some objects to float.</li> <li>Explain the effects of pressure in terms of particles.</li> <li>Discuss applications of changing pressure.</li> </ul> <p><b>Forces</b></p> <ul style="list-style-type: none"> <li>Discuss applications of friction.</li> <li>Calculate the resultant force.</li> <li>Interpret resultant forces and use this to predict motion.</li> <li>Re-arrange an equation to calculate the weight of an object.</li> <li>Explain why weight can vary but mass remains unchanged.</li> <li>Calculate extension of a spring.</li> </ul> <p><b>Energy Stores</b></p> <ul style="list-style-type: none"> <li>Justify suggestions about suitability of energy resources.</li> <li>Compare non-renewable and renewable fuels and their pros and cons.</li> </ul>	

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	<p align="center">+ Mastering - (Projected Grades 6 - 8 at GCSE)</p>			<ul style="list-style-type: none"> <li>Evaluate energy efficiency.</li> <li>Discuss how all materials have a store of energy inside them.</li> <li>Explain what happens to energy stores as energy is transferred by an object referring to useful and dissipated energy in a system.</li> <li>Compare energy resources and efficiency.</li> <li>Describe the basic principals surrounding a motor.</li> </ul> <p><b>Universe</b></p> <ul style="list-style-type: none"> <li>Explain how light and heat energy travel to Earth from the Sun.</li> <li>Explain how the different seasons occur with reference to the tilt of the Earth and proximity to the Sun.</li> <li>Explain the difference between a calendar and a lunar month.</li> <li>Explain why hours of sunlight and average temperatures change throughout the seasons.</li> <li>Apply knowledge of the seasons in the northern hemisphere to explain why the southern hemisphere experiences seasons differently.</li> <li>Explain how light years are calculated and how we can use the light year as a relative distance when comparing an objects location within the universe.</li> <li>Explain why the position of the Earth in relation to the moon affects the appearance of the moon on Earth.</li> </ul>

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**Descriptors of Key Knowledge Skills and Understanding for Key Stage 3**  
**What do students know and what can they do?**

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	<p align="center">+ Securing - Projected Grades 3 - 5 at GCSE</p>	<p><b>Digestion</b></p> <ul style="list-style-type: none"> <li>Describe the role of food groups and explain the consequences of unbalanced diet.</li> <li>Describe the main stages of digestion.</li> <li>Describe how to perform 4 food test procedures.</li> <li>Identify factors that can affect the rate of enzyme activity and describe how the body maintains optimum conditions for enzymes.</li> <li>Calculate and compare energy values of food.</li> <li>Describe what coronary heart disease is, identify factors that increase risk of CHD, and describe interventions to treat coronary heart disease.</li> </ul> <p><b>Breathing &amp; respiration</b></p> <ul style="list-style-type: none"> <li>State that respiration releases energy from food.</li> <li>State the difference between aerobic and anaerobic, in terms of oxygen requirements and reactants and products.</li> <li>Label a diagram of the gas exchange system.</li> </ul>	<p><b>Periodic Table/Metals &amp; Non Metals</b></p> <ul style="list-style-type: none"> <li>Describe that elements with similar physical and chemical properties are grouped together.</li> <li>Describe Mendeleev's contribution to the periodic table.</li> <li>Describe that elements with similar physical and chemical properties are grouped together.</li> <li>Describe the patterns of reactivity for Group 1 and Group 7.</li> </ul> <p><b>Chemical Reactions</b></p> <ul style="list-style-type: none"> <li>Describe the difference between chemical and physical changes and can simply describe different types of chemical reaction.</li> <li>State that during chemical reactions atoms are rearranged in order for reactants to become products and name some ways to speed up chemical reactions.</li> <li>Describe the role of catalysts.</li> <li>State that mass is conserved during changes of state and chemical reactions.</li> <li>Describe neutralisation, combustion, thermal decomposition, oxidation, displacement and the reaction of metals and acids as examples of chemical reactions.</li> </ul>	<p><b>Electricity</b></p> <ul style="list-style-type: none"> <li>Identify the direction of current flow.</li> <li>Describe the flow of current in parallel circuits.</li> <li>Describe how to connect an ammeter and a voltmeter within a circuit.</li> <li>Describe p.d. in a parallel circuit.</li> <li>Describe the effects of increased resistance.</li> <li>Calculate current or resistance using an equation.</li> <li>Describe electrostatic forces as affecting objects inside the electric field of a charged object.</li> <li>Explain why objects attract or repel.</li> </ul> <p><b>Magnets &amp; Electromagnets</b></p> <ul style="list-style-type: none"> <li>Describe Earth and compasses as examples of magnets</li> <li>Describe temporary and permanent magnets, and strength and distance of field lines.</li> <li>Show the direction of magnetic field lines.</li> <li>Describe how to make an electromagnet and increase its strength.</li> </ul>

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	+ - Securing (Projected Grades 3 - 5 at GCSE)	<ul style="list-style-type: none"> <li>Describe what happens to key respiratory organs during inhalation and exhalation.</li> <li>Describe the impact of exercise, asthma and smoking.</li> <li>Describe the effects on health and behaviour when an individual takes recreational drugs.</li> </ul> <p><b>Plants &amp; Photosynthesis</b></p> <ul style="list-style-type: none"> <li>Describe leaf adaptations including the role of stomata, and state the word equation for photosynthesis.</li> <li>List the products and reactants of photosynthesis.</li> <li>Describe how to test a leaf for starch.</li> <li>Describe how a plant uses minerals for growth.</li> <li>Explain the role of stomata in leaves.</li> </ul> <p><b>Variation &amp; Inheritance</b></p> <ul style="list-style-type: none"> <li>Explain the role of gametes in fertilization.</li> <li>Describe how variation is caused and what a gene bank is.</li> </ul>	<ul style="list-style-type: none"> <li>Represent chemical reactions using word equations.</li> <li>Describe the steps in making a salt in a neutralisation reaction</li> <li>Describe the reactivity series.</li> <li>Describe simple displacement reactions when given the order of metals and carbon in the reactivity series.</li> <li>Describe how metal oxides and non-metal oxides react with water</li> <li>Describe that during chemical reactions, surroundings may increase or decrease in temperature</li> <li>State that during chemical reactions reactants become products.</li> </ul> <p><b>Acids &amp; Alkalis</b></p> <ul style="list-style-type: none"> <li>Identify acids, alkalis and neutral substances on the pH scale.</li> <li>Describe how to use Universal indicator to find the strength of an acid or an alkali.</li> </ul> <p><b>Earths Structure</b></p> <ul style="list-style-type: none"> <li>Label a basic diagram showing the make up of the structure of the Earth.</li> <li>Compare the layers of the Earth.</li> <li>Describe the process of weathering and erosion.</li> </ul>	<p><b>Heating &amp; Cooling</b></p> <ul style="list-style-type: none"> <li>Describe the transfer of energy by conduction, convection, radiation using particle theory.</li> <li>Explain a heating and cooling curve.</li> <li>Describe applications of thermal insulators.</li> <li>Describe what happens to particles as a substance expands.</li> <li>Explain conduction, convection and radiation in terms of particles.</li> </ul> <p><b>Electricity, Energy Transfer &amp; Cost</b></p> <ul style="list-style-type: none"> <li>Describe what a higher power rating is and explain the effect of higher power ratings on cost, and wasted energy</li> </ul> <p><b>Speed &amp; Acceleration</b></p> <ul style="list-style-type: none"> <li>Describe changes in relative motion.</li> <li>Describe factors that can affect an object's speed.</li> <li>Calculate average speed.</li> </ul>

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<b>Key Stage 3</b> <b>Descriptors</b>  + - Securing (Projected Grades 3 - 5 at GCSE)	<b>Key Stage 3</b> <b>Descriptors</b>	<b>Descriptors of Key Knowledge Skills and Understanding for Key Stage 3</b> <b>What do students know and what can they do?</b>			
	<b>Key Stage 3</b> <b>Descriptors</b>	<b>Key Stage 3</b> <b>Descriptors</b>	<b>Key Stage 3</b> <b>Descriptors</b>	<b>Key Stage 3</b> <b>Descriptors</b>	<b>Key Stage 3</b> <b>Descriptors</b>
	<b>Biology</b>	<b>Chemistry</b>	<b>Physics</b>	<b>Scientific skills</b>	
	<ul style="list-style-type: none"> <li>Describe the structure of DNA and describe various collaborations by other scientists in the field.</li> <li>Explain how variation can be continuous or discontinuous</li> </ul> <p><b>Evolution</b></p> <ul style="list-style-type: none"> <li>Describe how variation enables some organisms to better compete in their habitats.</li> <li>Explain how competition can lead to extinction, referring to natural selection where possible.</li> <li>Explain the importance of biodiversity within an ecosystem.</li> </ul> <p><b>Cells</b></p> <ul style="list-style-type: none"> <li>Be able to identify and describe the roles of parts of a plant and animal cell on a diagram.</li> <li>Compare structure and function of animal and plant cells.</li> <li>Describe the role of diffusion in cells.</li> <li>Describe organisation of multicellular organisms.</li> </ul>	<ul style="list-style-type: none"> <li>Describe some properties of different materials e.g.: ceramics, polymers and composites.</li> <li>Describe the stages of the rock cycle and how different types of rock are formed.</li> </ul> <p><b>Climate &amp; Earths Resources</b></p> <ul style="list-style-type: none"> <li>Name the main elements in the atmosphere and Earth, including carbon based compounds.</li> <li>Describe that the Earth's resources are limited.</li> <li>Describe what is meant by an 'ore' and state two ways the metal can be extracted.</li> <li>Describe the composition and structure of the atmosphere.</li> <li>Describe ways that human activities impact on the climate.</li> <li>Describe the stages of the carbon cycle.</li> <li>Describe the impact of human activities on the carbon cycle.</li> <li>Identify carbon 'sinks' and how this affects the levels of CO<sub>2</sub> in the atmosphere.</li> </ul>	<p><b>Moments</b></p> <ul style="list-style-type: none"> <li>Describe the role of levers.</li> </ul> <p><b>Work</b></p> <ul style="list-style-type: none"> <li>Calculate work done on an object.</li> </ul> <p><b>Waves – Light</b></p> <ul style="list-style-type: none"> <li>Describe how light behaves in relation to different materials.</li> <li>Describe how to make secondary colours of light.</li> <li>Draw ray diagrams.</li> <li>State the law of reflection.</li> <li>Describe absorption, dispersion, reflection, refraction and how we see colours.</li> <li>State the functions of parts of the human eye.</li> <li>Describe transverse waves, with reference to oscillations and energy.</li> <li>Recognise Superposition.</li> </ul> <p><b>Waves – Sound</b></p> <ul style="list-style-type: none"> <li>Describe the reflection of an observed wave in water.</li> <li>Label compressions and rarefactions.</li> <li>Describe echoes and applications of absorbing sound.</li> </ul>		
	<p align="center"><i>Curriculum is all about power. Decisions about what knowledge to teach are an exercise of power and therefore a weighty ethical responsibility.” Taking Curriculum Seriously’ – Counsell, C (2018)</i></p>				

**Descriptors of Key Knowledge Skills and Understanding for Key Stage 3  
What do students know and what can they do?**

Key Stage 3 Descriptors	Biology	Chemistry	Physics	Scientific skills
	+ - Securing (Projected Grades 3 - 5 at GCSE)	<p><b>Movement</b></p> <ul style="list-style-type: none"> <li>Describe the functions of the musculoskeletal system.</li> <li>Describe the functions of various tissues within the musculoskeletal system.</li> <li>Explain how parts of the musculoskeletal system work together.</li> <li>Describe how to measure forces exerted by muscles.</li> </ul> <p><b>Human Reproduction</b></p> <ul style="list-style-type: none"> <li>Describe stages of menstrual cycle.</li> <li>Describe the stages of pregnancy and birth for animals.</li> <li>Describe how substances are exchanged between mum and fetus.</li> </ul> <p><b>Plant Reproduction</b></p> <ul style="list-style-type: none"> <li>Describe the functions of various tissues within a flowering plant.</li> <li>Explain how plants rely on pollination by wind and insects.</li> <li>Describe the process of fertilization and germination in plants.</li> </ul>	<p><b>Atoms, Elements &amp; Compounds</b></p> <ul style="list-style-type: none"> <li>State the relative sizes of an atoms particles</li> <li>List examples of atoms, elements and compounds.</li> <li>Label the subatomic particles of a simple atomic model.</li> <li>Explain the differences between atoms, elements and compounds.</li> <li>Represent compounds using chemical formulae.</li> <li>Describe how the properties of metals and non-metals make them suitable for different uses.</li> <li>Represent chemical reactions using word equations.</li> </ul> <p><b>Particle Model</b></p> <ul style="list-style-type: none"> <li>Describe and explain the properties of the three states of matter using the particle model.</li> <li>Identify and predict the state of substances dependent on the temperature.</li> <li>Describe diffusion in terms of the particle model.</li> <li>Suggest factors that affect the rate of diffusion.</li> <li>Describe changes of states with reference to energy changes.</li> <li>Use the particle model to explain states, state changes, density and diffusion.</li> </ul>	<ul style="list-style-type: none"> <li>Describe sonar, ultrasound and echolocation.</li> </ul> <p><b>Pressure</b></p> <ul style="list-style-type: none"> <li>Calculate stress on solids and calculate pressure in liquids and gases.</li> <li>Describe and explain the effects of stress on solids and pressure in liquids and gases.</li> </ul> <p><b>Forces</b></p> <ul style="list-style-type: none"> <li>Describe balanced and resultant forces, the effects of air and water resistance.</li> <li>Use force diagrams to summarise forces acting on an object.</li> <li>Explain when a force is balanced or unbalanced using force diagrams.</li> <li>Explain ways to reduce or increase friction, air resistance and water resistance.</li> <li>Describe the difference between mass and weight.</li> <li>Use an equation to calculate weight,</li> <li>Describe factors that affect the size of gravity.</li> </ul>

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**Descriptors of Key Knowledge Skills and Understanding for Key Stage 3**  
**What do students know and what can they do?**

Key Stage 3 Descriptors	Biology	Chemistry	Physics	Scientific skills
	- Securing + (Projected Grades 3 - 5 at GCSE)	<p><b>Interdependence</b></p> <ul style="list-style-type: none"> <li>• Explain how organisms are adapted to their environment.</li> <li>• Make and interpret simple food chains.</li> <li>• Construct and interpret food webs.</li> <li>• Describe how organisms are adapted to survive in a habitat.</li> </ul>	<p><b>Separating Mixtures</b></p> <ul style="list-style-type: none"> <li>• Describe how to separate mixtures.</li> <li>• Describe how impurities may affect boiling and melting points of impure substances.</li> <li>• Explain how melting points can be used to identify a pure substance.</li> </ul>	<p><b>Energy Stores</b></p> <ul style="list-style-type: none"> <li>• Describe different energy resources.</li> <li>• Recall forms of potential energy.</li> <li>• Describe situations where energy is transferred, wasted and dissipated</li> <li>• Calculate useful and dissipated energy in a system.</li> <li>• Calculate efficiency.</li> </ul> <p>Universe</p> <ul style="list-style-type: none"> <li>• Describe what is meant by a star, constellation, galaxy, solar system and universe.</li> <li>• Describe celestial bodies in order of size.</li> <li>• Describe how seasons are caused.</li> <li>• Explain what causes a leap year.</li> <li>• Identify the phases of the moon.</li> </ul>

**Descriptors of Key Knowledge Skills and Understanding for Key Stage 3**  
**What do students know and what can they do?**

Biology	Chemistry	Physics	Scientific skills
<p><b>Digestion</b></p> <ul style="list-style-type: none"> <li>Name most of the organs that make up the digestive system.</li> <li>Briefly describe the role of some of the key organs in the digestive system.</li> </ul> <p><b>Breathing &amp; Respiration</b></p> <ul style="list-style-type: none"> <li>Name some tissues involved in gas exchange.</li> </ul> <p><b>Plants &amp; Photosynthesis</b></p> <ul style="list-style-type: none"> <li>Understand that photosynthesis is essential for life on Earth.</li> <li>State the raw materials needed for photosynthesis.</li> <li>Label some parts of a cross section of a leaf.</li> <li>Recall that photosynthesis is essential for life on Earth.</li> </ul> <p><b>Variation &amp; Inheritance</b></p> <ul style="list-style-type: none"> <li>Know that genetic information is inherited.</li> <li>Give examples of features that can be inherited,</li> </ul>	<p><b>Periodic Table/Metals &amp; Non Metals</b></p> <ul style="list-style-type: none"> <li>Identify where metals, non-metals, periods and groups can be found on the Periodic Table.</li> </ul> <p><b>Chemical Reactions</b></p> <ul style="list-style-type: none"> <li>State that some materials (particularly metals) are more reactive than others.</li> <li>Identify a chemical reaction based on a temperature change, colour change etc.</li> </ul> <p><b>Acids &amp; Alkalis</b></p> <ul style="list-style-type: none"> <li>Recognise that different acids and alkalis have different strengths.</li> </ul> <p><b>Earths Structure</b></p> <ul style="list-style-type: none"> <li>List the parts which make up the structure of the Earth.</li> <li>Name the three different types of rocks.</li> </ul>	<p><b>Electricity</b></p> <ul style="list-style-type: none"> <li>Identify a series and a parallel circuit from a diagram.</li> <li>State what is meant by p.d and know that current in a series circuit does not change.</li> <li>Name component symbols.</li> </ul> <p><b>Magnets &amp; Electromagnets</b></p> <ul style="list-style-type: none"> <li>List uses of electromagnets and recognise how they work.</li> </ul> <p><b>Heating &amp; Cooling</b></p> <ul style="list-style-type: none"> <li>Recognise that energy is conserved or transferred, and that heat is transferred by convection, conduction and radiation.</li> <li>Give examples of insulators</li> </ul> <p><b>Moments</b></p> <ul style="list-style-type: none"> <li>State what a moment is</li> </ul> <p><b>Waves – Light</b></p> <ul style="list-style-type: none"> <li>Label part of a diagram that shows reflection and refraction.</li> <li>Identify parts of the eye.</li> </ul>	<p><b>Method</b></p> <p>-Select appropriate apparatus to use and use it appropriately. Follow a set of teacher based instructions to complete an investigation safely.</p> <p><b>Recording results</b></p> <p>-Record data in a table provided. Correctly use some units.</p> <p><b>Graphs</b></p> <p>-Label axes -Plot data as a bar chart if a scale is provided.</p> <p><b>Conclusion and evaluation</b></p> <p>-- Be able to read data from a bar chart or line graph. -Identify simple patterns and trends in data to state a simple conclusion.</p>

**Descriptors of Key Knowledge Skills and Understanding for Key Stage 3  
What do students know and what can they do?**

<p align="center"><b>Key Stage 3 Descriptors</b></p> <p align="center">+ Developing - (Projected Grades 1 – 2 at GCSE)</p>	<b>Biology</b>	<b>Chemistry</b>	<b>Physics</b>	<b>Scientific skills</b>
	<p><b>Evolution</b></p> <ul style="list-style-type: none"> <li>Describe factors that could lead to extinction of a species.</li> </ul> <p><b>Cells</b></p> <ul style="list-style-type: none"> <li>List the main parts of a cell, and name some tissues and organs.</li> <li>From a diagram identify various organ systems.</li> <li>Understand that materials can move across a cell membrane by the process of diffusion.</li> <li>Give examples of materials that may need to move across a cell membrane by diffusion.</li> </ul> <p><b>Movement</b></p> <ul style="list-style-type: none"> <li>Give examples of some muscles that make up the musculoskeletal system</li> </ul> <p><b>Human Reproduction</b></p> <ul style="list-style-type: none"> <li>Name the organs in the reproductive system.</li> <li>Describe the functions of some key organs in the reproductive system.</li> </ul>	<p><b>Climate &amp; Earths Resources</b></p> <ul style="list-style-type: none"> <li>List human activities that impact on the climate.</li> <li>Name some resources that humans use from the Earth.</li> </ul> <p><b>Atoms, Elements &amp; Compounds</b></p> <ul style="list-style-type: none"> <li>Can identify some elements based on their chemical symbol.</li> <li>Can recognize substances classed as an element, compound or mixture.</li> <li>List the properties of metals and non-metal.</li> </ul> <p><b>Particle Model</b></p> <ul style="list-style-type: none"> <li>Describe the properties of the three states.</li> <li>Represent the three states of matter with particle diagrams.</li> <li>State that during changes of state, there are energy changes.</li> </ul> <p><b>Separating Mixtures</b></p> <ul style="list-style-type: none"> <li>Describe what a pure substance and a mixture is.</li> <li>Identify simple techniques for separating mixtures.</li> </ul>	<p><b>Waves – Sound</b></p> <ul style="list-style-type: none"> <li>State that sound waves are longitudinal.</li> </ul> <p><b>Pressure</b></p> <ul style="list-style-type: none"> <li>Describe how floating or sinking is dependent on density.</li> <li>Calculate density.</li> <li>Explain some applications of changing pressure.</li> <li>Calculate the size of pressure.</li> <li>Recognise the effect of changing pressure on an object, and when pressure increases or decreases.</li> </ul> <p><b>Forces</b></p> <ul style="list-style-type: none"> <li>Identify contact and non contact forces.</li> <li>State the unit of measurement for forces.</li> <li>Describe simple changes in motion.</li> <li>Name the force that holds all the celestial bodies in orbit.</li> </ul>	

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**Descriptors of Key Knowledge Skills and Understanding for Key Stage 3**  
**What do students know and what can they do?**

Key Stage 3 Descriptors  + Developing - (Projected Grades 1 – 2 at GCSE)	Key Stage 3 Descriptors	Descriptors of Key Knowledge Skills and Understanding for Key Stage 3 What do students know and what can they do?			
	+ Developing - (Projected Grades 1 – 2 at GCSE)	Key Stage 3 Descriptors	Key Stage 3 Descriptors	Key Stage 3 Descriptors	Key Stage 3 Descriptors
	<b>Biology</b>	<b>Chemistry</b>	<b>Physics</b>	<b>Scientific skills</b>	
	<ul style="list-style-type: none"> <li>Give examples of substances that pass between mother and fetus.</li> </ul> <p><b>Plant Reproduction</b></p> <ul style="list-style-type: none"> <li>Label some parts of a flowering plant.</li> </ul> <p><b>Interdependence</b></p> <ul style="list-style-type: none"> <li>Describe conditions within a habitat.</li> <li>Briefly describe how the numbers of one organism can affect the numbers of another.</li> <li>Give examples of resources organisms may compete for.</li> </ul>		<p><b>Energy Stores</b></p> <ul style="list-style-type: none"> <li>List energy resources and stores.</li> <li>State the unit for measuring energy.</li> </ul> <p><b>Universe</b></p> <ul style="list-style-type: none"> <li>Identify simple celestial objects on a diagram.</li> <li>State that the Earth is tilted on its axis and interpret data to deduce day length and year length of various planets.</li> </ul>		



**Descriptors of Key Knowledge Skills and Understanding for Key Stage 3**  
**What do students know and what can they do?**

Emerging +  
 - (Below GCSE Grading)

Biology	Chemistry	Physics	Scientific skills
<p><b>Digestion</b></p> <ul style="list-style-type: none"> <li>List the contents of a balanced diet.</li> <li>Name the main organs making up the digestive system.</li> </ul> <p><b>Breathing &amp; Respiration</b></p> <ul style="list-style-type: none"> <li>Name some organs involved in gas exchange.</li> </ul> <p><b>Plants &amp; Photosynthesis</b></p> <ul style="list-style-type: none"> <li>State the raw materials needed for photosynthesis</li> <li>Label the main organs of a plant and describe the role of the roots, leaves and flower.</li> </ul> <p><b>Inheritance &amp; Variation</b></p> <ul style="list-style-type: none"> <li>Give examples of variation within a species.</li> </ul> <p><b>Cells</b></p> <ul style="list-style-type: none"> <li>State what cells are.</li> <li>Name equipment used to view cells.</li> </ul>	<p><b>Periodic Table/Metals &amp; Non Metals</b></p> <ul style="list-style-type: none"> <li>Know elements are located in the periodic table.</li> </ul> <p><b>Acids &amp; Alkalis</b></p> <ul style="list-style-type: none"> <li>Use an indicator to determine whether a substance is an acid or an alkali.</li> </ul> <p><b>Earths Structure</b></p> <ul style="list-style-type: none"> <li>Identify the three rock layers of the Earth.</li> <li>Be able to state the three different types of rock.</li> </ul> <p><b>Climate &amp; Earths Resources</b></p> <ul style="list-style-type: none"> <li>Describe ways that humans use the Earth as a source of resources and these are limited.</li> </ul> <p><b>Atoms, Elements &amp; Compounds</b></p> <ul style="list-style-type: none"> <li>Can recognise that all matter is made of atoms.</li> <li>Name some elements and compounds.</li> <li>List examples of mixtures.</li> <li>Recognise that different materials have different properties.</li> </ul>	<p><b>Electricity</b></p> <ul style="list-style-type: none"> <li>Recall that circuits must be complete.</li> <li>State the units for current, resistance and potential difference.</li> </ul> <p><b>Magnets &amp; Electromagnets</b></p> <ul style="list-style-type: none"> <li>Name types of magnets.</li> <li>Know that like poles repel and opposite poles attract.</li> <li>Name the three magnetic materials.</li> </ul> <p><b>Heating &amp; Cooling</b></p> <ul style="list-style-type: none"> <li>Use a thermometer correctly</li> </ul> <p><b>Electricity, Energy Transfer &amp; Cost</b></p> <ul style="list-style-type: none"> <li>Identify that appliances have power ratings (W, kW).</li> </ul> <p><b>Speed &amp; Acceleration</b></p> <ul style="list-style-type: none"> <li>Describe what speed is.</li> </ul> <p><b>Waves – Light</b></p> <ul style="list-style-type: none"> <li>Understand that light travels at a faster rate than sound.</li> <li>Identify objects that form images.</li> </ul>	<p><b>Method</b></p> <ul style="list-style-type: none"> <li>Ask questions based on behaviour of the world and follow a set of instructions safely.</li> <li>Name apparatus.</li> </ul> <p><b>Recording data</b></p> <ul style="list-style-type: none"> <li>With support, record data in a pre-given simple table.</li> </ul> <p><b>Graphs</b></p> <ul style="list-style-type: none"> <li>If a scale is provided, add bars to a bar chart.</li> </ul> <p><b>Conclusions and evaluations</b></p> <ul style="list-style-type: none"> <li>Simply state what happened in an experiment.</li> </ul>

Key Stage 3 Descriptors	Descriptors of Key Knowledge Skills and Understanding for Key Stage 3 What do students know and what can they do?			
	Biology	Chemistry	Physics	Scientific skills
Emerging + (Below GCSE Grading)	<p><b>Movement</b></p> <ul style="list-style-type: none"> <li>Understand that some muscles are stronger than others.</li> </ul> <p><b>Human Reproduction</b></p> <ul style="list-style-type: none"> <li>Give examples of harmful substances that can pass from mother to fetus.</li> </ul> <p><b>Plant Reproduction</b></p> <ul style="list-style-type: none"> <li>Name some tissues that make up a flowering plant.</li> </ul> <p><b>Interdependence</b></p> <ul style="list-style-type: none"> <li>Give examples of factors that could affect a population size.</li> <li>Give examples of habitats.</li> </ul>	<p><b>Particle Model</b></p> <ul style="list-style-type: none"> <li>Name the three states of matter.</li> <li>List the changes of state.</li> </ul>	<p><b>Waves – Sound</b></p> <ul style="list-style-type: none"> <li>State how sound is produced.</li> <li>Understand that sound can not travel through a vacuum due to the absence of particles.</li> </ul> <p><b>Pressure</b></p> <ul style="list-style-type: none"> <li>Give examples where pressure can be increased or decreased.</li> </ul> <p><b>Forces</b></p> <ul style="list-style-type: none"> <li>Name some simple forces.</li> </ul> <p><b>Energy Stores</b></p> <ul style="list-style-type: none"> <li>Recognise what energy is and where it is stored.</li> </ul> <p><b>Universe</b></p> <ul style="list-style-type: none"> <li>State the length of a day, month and year.</li> <li>Know that gravity always pulls towards the centre of an object.</li> <li>List planets in and seasons in order.</li> </ul>	

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