

**Summative Assessment in Science (list summative assessments in KS3 and KS4)**

<b>Assessment</b>	<b>Essential Component Knowledge</b>	<b>Why is this essential knowledge?</b>	<b>Misconceptions Often Addressed</b>	<b>What are the essential skills?</b>	<b>Why is this an essential skill?</b>
<ul style="list-style-type: none"> <li>Yr 7 assessment 1 Variables</li> </ul>	<ul style="list-style-type: none"> <li>The difference between IV, DV and CV</li> </ul>	Knowledge needed for GCSE exams need to know dependant and independent variables.	Control variables=fair test	Identifying variables	Variables will be referred to throughout the science curriculum.
<ul style="list-style-type: none"> <li>Y7 Assessment 2 Exam</li> </ul>	<ul style="list-style-type: none"> <li>Forces, matter, cells, variables.</li> </ul>	Will be developed in Yr 8 and KS4 pupils need to be able to label a cell and draw accurate force diagrams.	Nucleus is the 'brain' of the cell. Width v length of force arrows, gaps between particles in matter.	Taking accurate readings, analysing information, consolidating information to draw conclusions.	KS4 knowledge is dependent on an understanding of them.
<ul style="list-style-type: none"> <li>Yr 7 assessment 3 Methods</li> </ul>	Investigation skills	Pupils need to be able to write a bullet pointed method and identify errors in methods.	Bullet point methods	Writing a concise method	There are 6 mark questions based on the ability to write an accurate method.
<ul style="list-style-type: none"> <li>Y7 Assessment 4 exam</li> </ul>	Reproduction, light and sound, interdependence, structure of the earth. Space	<p>Key information that will be tested throughout years 8-11.</p> <p>Will be developed in yr 8 and KS4</p>	Sound is faster than light,	Analysing information	Science depends upon the ability to analyse findings.

<ul style="list-style-type: none"> <li>Y8 Assessment 1 Investigation errors</li> </ul>	The different types of error that can occur in an investigation.	Pupils need to be able to identify reasons for errors in investigations.	Use term fair test instead of control variables.	Identify errors.	Pupils have to be able to identify the source of an error.
<ul style="list-style-type: none"> <li>Y8 Assessment 2 Exam</li> </ul>	Forces, elements, photosynthesis	Pupils need to be able to understand the language of exams, so they need to be subjected to different styles of exam question.	Size of force arrows, reactions,	Read questions carefully, recall key facts and analyse data.	Pupils need to be able to answer questions in an exam environment. To prepare them for GCSE.
Yr 8 Assessment 3 Investigation method	To be able to write a method in a structured format.	Need to write a method in GCSE.	Need for detail in the instructions.	Write clear instructions in a logical sequence.	Pupils will be asked questions at GCSE that require them to be able to write a step by step method.
Yr 8 assessment 4 Analysis	Investigation skills analysing results.	Need to analyse data when answering exam questions.	Do not describe the pattern of the results.	Read questions carefully, recall key facts and analyse data.	Data analysis is important when making decisions.

Yr 8 assessment 5 Exam	Evolution, magnetism, digestion, reactions, periodic table, waves, heating and cooling.	Knowledge will be developed at GCSE	Mix up explain and describe	Read questions carefully, recall key facts and analyse data	Pupils need to be able to answer questions in an exam environment. To prepare them for GCSE.
Year 9 Biology Assessment 1	The essential component of the assessment is to explore the key structures and function of organelles in a cell (animal and plant).	Organelles are contained within a cell studying these through microscopic techniques. Fundamental knowledge for GCSE Biology.	Unit conversions in magnification calculations.	Read questions carefully, graph analysis, Math in Science	To analyse the differences between animal and plant cells
Year 9 Biology Assessment 2	The key component of this assessment is to examine how substance are transported in and out of a cell.	Pupils need to be able to discuss the three key forms of cell transportation: diffusion, osmosis and active transport. Pupils will build upon this throughout the GCSE content, for example photosynthesis.	Osmosis is associated with water only. Impact of surface area to volume ratio on cell transportation.	Read questions carefully, graph analysis, discussion on 6 mark questions	To understand the process of how substance move in and out of cells in both animals and plants.

Year 9 Biology Assessment 3	The key component of this assessment is to identify how cells divide (the process) and why they divide.	Pupils will need to understand how cells divide through mitosis to form identical cells. They will need to recall where stem cells are formed, to discuss the use of stem cells and the ethics associated. This will then form a key understanding for the future topic of reproduction and genetics.	Therapeutic cloning methods.	Read questions carefully, graph analysis, discussion on 6 mark questions	To understand the process of how cells replicate and the importance of this.
Year 9 Biology- End of year 9 Assessment	Cell Biology and Organisation (part of the topic)	Pupils will need to recall and apply to the exam question the topics of: the cell structure, cell transport, cell division, digestive system, respiratory system, circulatory system, plant organisation.	Graph interpretation skills. Ethics of stem cells.	Read questions carefully, graph analysis, discussion on 6 mark questions	Examined at GCSE
• Year 9 Chemistry Assessment 1	Atom structure Sub – atomic particle/properties Electron configuration Ions and isotopes	Basic fundamental knowledge for GCSE chemistry	Location of protons, neutrons and electrons.	Interpretation and analysis	It affects total numbers of sub-atomic particles and atom properties. It

<p>Year 9 Chemistry Assessment 2</p>	<p>Atoms, bonding and moles</p>				<p>enables pupils to distinguish between the atomic and electronic structures</p>
	<p>Separation techniques How science work</p>	<p>Prediction of properties of elements</p>	<p>Mix up group 1 and 7 reactivity trends</p>	<p>Identification of atoms/ions/isotopes</p>	<p>Pupils are able to see what happens to electrons in Group 1 and group 7 in the formation of ions and this then leads them into ionic bonding and they can then visualise the transfer of electrons If students are able to visualise how many electrons are being transferred to each atom until they gain a full outer shell, they will be able to form formulas from the respective ions by cancelling the positive ions and negative ions</p>
	<p>Periodic table trends and pattern</p>	<p>Prediction reactions leads to more chemical reactions</p>	<p>How the elements are ordered.  Distillation is based on boiling points</p>		

<p>Year 9 Chemistry - Assessment 3 Structure and Bonding</p>	<p>States of matter Ionic Bonding Covalent Bonding Giant Covalent Structures Metallic Bonding</p>	<p>Students before they start should all be able to recall solids liquids and gases as this is the basics of science. Ionic Bonding takes place between metals and non-metals. Covalent bonding takes place between nonmetals pupil see the key types of bonding being applied in real life examples eg table salt, graphite diamond etc Common exam question application question</p>	<p>Pupils get confused when the electrons need to be mentioned when it comes to ionic bonding and when ions need to be mentioned</p>	<p>Identification of what happens to the reactivity between the Group 1 metals and Group 7 non metals. Ionic bonding metals donate electrons and nonmetals gain electrons Ionic bonds are held together by strong electrostatic forces of attraction Ionic compounds conduct electricity when molten or in solution as ions are free to move Covalent bonds are extremely strong and require lots of energy to break Weak Intermolecular forces of attraction</p>	<p>Covalent compounds pupils will become familiarised with the molecular and displayed formula, and this will help in organic chemistry in Year 11 and beyond if students pursue a career in chemistry</p>
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<p>Year 9 Chemistry</p> <ul style="list-style-type: none"> <li>End of year assessment</li> </ul>	<p>Separation techniques How science works Periodic table trends and pattern States of matter Ionic Bonding Covalent Bonding Giant Covalent Structures Metallic Bonding</p>	<p>Will be built upon in the following chemistry units</p>	<p>Mix up group 1 and 7 reactivity trends How the elements are ordered. Distillation is based on boiling points Pupils get confused when the electrons need to be mentioned when it comes to ionic bonding and when ions need to be mentioned</p>	<p>are present in simple covalent molecules Giant covalent structures and properties</p> <p>Recall information, calculations, information analysis. Data interpretation</p>	<p>Draw and explain the different types of bonding.</p>
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<ul style="list-style-type: none"> <li>Year 9 Physics Assessment 1 - Energy</li> </ul>	The different types of energy, how it is transferred, how it is made and how it is lost.	Pupils need to be able to identify energy transfers and calculate the efficiency. They need to be able to recall sources of energy and assess their suitability.	Energy changes, open and closed systems	Energy Calculations, analysing information	Pupils need to be able to make informed choices on energy efficient products
<ul style="list-style-type: none"> <li>Year 9 Physics Assessment 2 - radiation</li> </ul>	What alpha beta and gamma radiation is made up of and the properties of each.	Pupils need to be able to use the knowledge of alpha beta and gamma radiation to describe and explain results.	Number of half-lives, radiation is from the atom not the nucleus.	calculate radioactive decay, analyse data on radioactive substances.	Need to be able to calculate the half - life of a substance and select the appropriate isotope for a given use e.g. medical tracer.
<ul style="list-style-type: none"> <li>Year 9 End of Year Assessment</li> </ul>	Energy and radiation	Pupils need to be able to use their knowledge to apply it to new situations.	How to re arrange equations	Recall information, calculations, information analysis.	Pupils need to be able to use information to apply their knowledge to answer G.C.S.E. questions.



Year 10 Biology Assessment 1	The essential component of this assessment is to explore the different systems that form the human organism.	To understand the key principles of the following systems; digestive, circulatory, respiratory. Pupils need to apply this to explain the system adaptations.	The differences between the xylem and phloem. Difficulty linking the process of transpiration to novel scenarios. Inaccurate food tests associated.	Recall key content, develop explanations in 6 mark questions, particularly surrounding adaptations of the respiratory and digestive system.	Applying the essential knowledge of each system to a novel question.
Year 10 Biology Assessment 2	The essential component of this assessment is to examine to four key pathogens that cause disease.	Pupils need to understand how pathogens make us ill; how we are infected and how we can prevent infection. Pupils need to be able to recall the four main pathogens; bacteria, virus, fungal and protist, and the associated diseases. Following on from this pupils need to understand the process of how vaccines are made and work to prevent viral diseases.	Key misconception is incorrect process of making vaccines.	Accurate graph analysis of data, describing and explaining the results. Clear key words utilised in 6 mark questions.	Pupils need to make informed decision of the appropriate treatment in terms of the infection.

Year 10 Biology Assessment 3	The essential component of this assessment is to examine the two metabolic processes of photosynthesis and respiration.	Pupils need to recall the key word equations for the bioenergetic reactions in plants and animals. They need to understand in detail both processes: photosynthesis and respiration. Pupils need to apply this knowledge to varying topics in Biology, such as how do we test for the products in the reactions (organisation).	The correct reactants and products for the word equations. The impact of limiting factors for photosynthesis.	Analysis of results in the forms of graphs and results tables and applying this to both reactions; respiration and photosynthesis. Recalling key Scientific methods for associated required practicals. Recall the word equations.	To understand two key metabolic reactions in plants and animals, which are seen throughout the GCSE Biology content.
Year 10 Biology Assessment 4	The essential component of this assessment is to explore how human maintain their internal systems; nervous and endocrine.	Pupils need to know the key principles of the nervous system and endocrine system. Pupils need to discuss the reproductive system, with reference to the menstrual cycle. Pupils need to evaluate the uses of contraceptive methods and treatment of infertility.	Recalling the key hormones in the menstrual cycle, such as FSH and their effects on the human body.	Retrieve information, discuss ethical situations particularly for infertility treatments. Recall methods for required practicals. Analyse the menstrual cycle graph.	Pupils need to evaluate key scenarios and apply to situations

Year 10 Chemistry - Assessment 1	Quantitative Chemistry eg moles, RFM and conservation of mass Rearranging equations Balancing equations	Students need to be able to rearrange equations as this works in coherence with physics and therefore it becomes necessary to learn how to do this	Pupils multiply the RAM instead of adding.	Mol equations Calculation of RFM Finding unknown masses using moles from an equation Using the concentration equation	Being able to use the mole equation leads to pupil being able to carry out titrations as well as calculations involving limiting reagents Getting students used to using the calculation for equations is a necessity for any mathematical exam
Year 10 Chemistry Assessment 2- Chemical Changes 10	How Science works Reactions of Metals in Acid and water Reaction of Insoluble bases in Acid Reaction of Acids and Alkalis Displacement reactions Strength and concentration of acids	Being able to plan a method is fundamental when it comes to a GCSE chemistry exam Getting used to these different reactions	Students tend to get confused what is a base and how it is categorised into insoluble bases and alkalis Ionic equations and how oxidation and reduction occur at the same time. Muddle identifying reduction and oxidisation of species.	Word and symbol equations for reactions between Metal + Water Metal + Acid Acid + Bases Acid + Alkali	It enables pupils to make links and identify patterns when other metals or acid may be used and how its similar and different Pupils can see how different metals in the reactivity series can be extracted via different techniques.

<p>Year 10 Chemistry Assessment 3 CHRISTMAS EXAM 10</p>	<p>Summary of C1 C2 and C3</p>	<p>Basic fundamental knowledge for GCSE chemistry</p>	<p>Sub-atomic locations Ion charge Rules of electron configuration</p>	<p>Identification of atoms/ions/isotopes</p>	<p>Method writing and being able to identify hazards in this experiment</p> <p>Pupils need to be able to use information to apply their knowledge to answer G.C.S.E. questions.</p>
<p>Year 10 Chemistry - Assessment 4 Electrolysis 10</p>	<p>Electrolysis of Ionic Compounds Formation of gas or metal at the electrodes when using Copper chloride and sodium chloride Electrolysis for the extraction of aluminium</p>	<p>Shows how Ionic compounds can conduct electricity as Ions are free to move and what happens at the electrodes</p>	<p>Students tend to get confused on which Ion moves to which electrode</p> <p>Students not making the link to the reactivity series table for the positive ions and periodic table for the negative ions</p>	<p>Identification of products at anode and cathode</p> <p>Half equations at anode and cathode</p>	<p>It enables pupils to see the movement of electrons and see what becomes oxidised and reduced which then makes the link back to previous work on Ionic equations</p>

<p>Year 10 Chemistry Assessment 5 Energy Changes</p>	<p>Exothermic and Endothermic reactions Reaction profiles of exothermic and endothermic graphs Bond energy calculations</p>	<p>Enables students to interpret graphs Able to draw graphs with correct labelling of the axis</p>	<p>Students tend to find it difficult understanding as to why exothermic releases heat, but temperature goes up and vice versa for endothermic</p>	<p>Ability to draw reaction profile curves</p> <p>Ability to state whether a reaction is exothermic or endothermic</p> <p>Carry out bond energy calculations</p>	<p>Students will be able to use the skills obtained in other subjects, so this is helping whole school in terms of interpreting and drawing graphs</p>
<p>Year 10 Chemistry Assessment 6 calculations</p>	<p>How the mole equation enables the building of more complex calculations.</p>	<p>RFM is common start for most chemical calculations Balancing equations/limiting reactants applicable in industrial reactions</p>	<p>Need to use method for balancing equations. If not done correctly may not be able to answer question.</p>	<p>Mol equations Calculation of RFM Finding unknown masses using moles from an equation identification of limiting reactant</p>	<p>Being able to use the mole equation leads to pupil being able to carry out titrations as well as calculations involving limiting reagents Getting students used to using the calculation for equations is a necessity for any mathematical exam question. High percentage of calculation/math-based questions in chemistry papers</p>

<ul style="list-style-type: none"> <li>Year 10 Physics Assessment 1 Electricity</li> </ul>	What the flow of electricity is and how it can be changed.	A knowledge of current and potential difference are needed to calculate fuses and use electricity safely	Current and potential difference are the same. High resistance results in low current.	Calculations of current, potential difference, resistance and charge.	They can use this to calculate the size of a fuse for an appliance to be used safely. Pupils can identify unsafe electrical features.
<ul style="list-style-type: none"> <li>Year 10 Physics Assessment 2 Christmas exam</li> </ul>	Energy, radioactivity, electricity	Examined on paper 1 of the physics papers	How resistance changes in different components	Recall information, complete calculations, analyse information	Practices exam technique in preparation for GCSE's
<ul style="list-style-type: none"> <li>Year 10 Physics Assessment 3 Molecules and matter</li> </ul>	The characteristics of the particles in solids, liquids and gases	Pupils need to use this knowledge to work out how particles change state	That particles in a gas are not touching	Recall information, complete calculations, analyse information	Pupils need to be able to use the skills to analyse information in exam questions

<ul style="list-style-type: none"> <li>Assessment 5 Year 10 Physics Mock Exam</li> <li>Year 10 Physics Assessment 6 Forces</li> </ul>	<p>Paper 1 content</p> <p>What the arrows in a force diagram represent and how balanced and unbalanced forces affect motion.</p>	<p>Examined on paper 1 of the physics papers</p> <p>Need to be able to use the knowledge to analyse force diagrams</p>	<p>Structure of liquids. Re arranging equations. Energy conversions.</p> <p>If forces are balanced the object is not moving. The thickness of the arrow represents the size.</p>	<p>Recall information, complete calculations, analyse information</p> <p>To identify the sizes of forces and relate them to motion. Use graphs and equations to calculate speed.</p>	<p>Preparation for the GCSE exam. Enable them to identify</p> <p>Pupils need to be able to use information to apply their knowledge to answer G.C.S.E. questions.</p> <p>Pupils need to be able to use forces to assess stopping distances and safety of roads and cars.</p>
<p>Year 11 Biology Assessment 1</p>	<p>The essential component is to comprehend how we inherit our genes and the impacts this can have on our DNA, including the influence of evolution.</p>	<p>Pupils need to be able to discuss how cells reproduce via mitosis and meiosis, linking back to the cell division topic (year 9). Pupils need to explore DNA; its structure and discovery, how this impact our genetics, such as</p>	<p>The difference between selective breeding and genetic engineering. Formulating a Punnett square from a novel scenario.</p>	<p>To be able to read questions carefully, develop answers clearly, recall key terms and their definitions, apply the core knowledge.</p>	<p>Pupils must be able to form a Punnett square from their knowledge and identify genetic inheritance from such.</p>

<p>Year 11 Biology Assessment 2</p>	<p>The essential component is to understand how organisms relate to one another and their for ever changing environment (Ecology).</p>	<p>genetic disorders. Pupils need to understand how and why we have developed genetics screening, selective breeding, cloning and the ethics associated with such. Pupils need to learn the origins of the species and the theory of natural selection (evolution).</p> <p>Pupils must understand how and why organisms are distributed through the environment. Pupils must apply their working Scientifically knowledge to sample a population. Pupils will learn how species are adapted for their environment, particularly in terms of survival of the fittest (linking back to the evolution topic). Pupils will understand the impacts of humans on biodiversity, e.g.</p>	<p>The difference between abiotic and biotic factors. The term biomass and how energy is lost in feeding relationships.</p>	<p>To be able to read questions carefully, interpret and analyse data, to understand key terms and apply to core knowledge.</p>	<p>Pupils need to analyse pyramids of biomass. They need to make informed decisions on how strategies impact biodiversity.</p>
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<p>Year 11 Biology Assessment 3 Mock exam</p>	<p>Paper 2 exam</p>	<p>population explosion and pollution, and how we can create and maintain a sustainable environment for all species.</p> <p>Examined on paper 1 of the Biology paper</p>	<p>Drawing graphs</p>	<p>Drawing graphs, data analysis. Recalling key terms and definitions</p>	<p>Pupils need to be able to use information to apply their knowledge to answer G.C.S.E. questions.</p>
<ul style="list-style-type: none"> <li>Year 11 Chemistry Assessment 1</li> </ul>	<p>Factors that affect the rate of reaction</p> <p>Collision theory</p> <p>What are reversible reactions and how it links into dynamic equilibrium</p>	<p>Pupils can see similarities and differences in their answers for the collision theory depending on which factor is being used and is vital for exam practice</p>	<p>That a catalyst does not have any impact on the position of equilibrium</p> <p>The movement of equilibrium symbol when the temperature changes and being able to describe what is happening</p>	<p>Essential calculating the rate of reaction from a graph and simple calculations</p> <p>Essential to see how Le Chateliers' principle affects the position of equilibrium symbol</p>	<p>Ability to use tangents is an essential mathematical skill</p> <p>Will help students construct their answers in a more logical way using SPAG</p>

<ul style="list-style-type: none"> <li>Year 11 Chemistry Assessment 2 -- crude oil and fuels</li> <li></li> </ul>	<p>Describe how crude oil is formed The two different categories of Hydrocarbons To see the difference in reactivity between alkanes and alkenes and the names for the common hydrocarbons Fractional Distillation Combustion of hydrocarbons</p>	<p>Delves into many application areas of chemistry and leads pupils onto organic chemistry which is a massive sector of chemistry</p>	<p>What the difference between saturated and unsaturated hydrocarbons are Explanation behind Fractional Distillation</p>	<p>Essential knowing the common alkanes and alkenes Essential knowing the formula for alkanes and alkenes</p>	<p>Being able to draw displayed and molecular formulas is essential for the development of a pupil in chemistry</p> <p>Key chemical skills in terms of the extraction of crude oil via cracking as it allows pupils to see how fuel is produced</p>
<ul style="list-style-type: none"> <li>Year 11 Chemistry Assessment 2</li> </ul>	<p>Climate Change Chromatography Gas Tests</p>	<p>Greenhouse effect common exam questions in chemistry and geography</p> <p>When doing practical's pupils can instantly see what gas is produced</p>	<p>Greenhouse effect and how it warms the atmosphere</p> <p>If there is a low amount of CO<sub>2</sub>, then why is it an issue for Global Warming</p>	<p>Essential knowing the factors that cause climate change and the consequences that occur from climate change</p> <p>Essential knowing the gas tests</p>	<p>It enables pupils to write detailed analysis on any factors of climate change as there are several long exam style written questions</p>
<p>Year 11 Chemistry Assessment 3</p>	<p>Water Treatment</p>	<p>How potable water is obtained</p>		<p>Essential knowing the stages to obtain potable water</p>	<p>Pupils can answer any questions regarding the removal of solid</p>

<ul style="list-style-type: none"> <li>Year 11 Physics Assessment 1- Waves</li> </ul>	<p>The properties of longitudinal and transverse waves</p>	<p>What two ways can we obtain potable water when there is salty water present or when there is no salty water present</p> <p>How wastewater is treated</p> <p>Pupils need to use this knowledge to identify waves and anticipate how they will behave in different situations</p>	<p>Difference between Distillation and Reverse Osmosis as both achieve the same goal but through different means</p> <p>What is aerobic digestion and anaerobic digestion</p> <p>Sound travels faster than light because they hear thunder before they see lightening.</p>	<p>Essential to know the methods regarding the two RP</p> <p>Essential to be able to write evaluations regarding LCA</p> <p>Essential to know the difference between Phytomining and bioleaching</p> <p>To identify the sizes of forces and relate them to motion. Use graphs and equations to calculate speed.</p>	<p>particles or the requirement of sterilisation</p> <p>Be able to write a comparative study in Exam style questions of any objects</p> <p>Pupils need to be able to use forces to assess stopping distances and safety of roads and cars.</p> <p>Pupils need to be able to apply the forces of magnetism to a number of situations</p>
<ul style="list-style-type: none"> <li>Year 11 Physics assessment 2 - electromagnetism</li> </ul>	<p>The pattern and effects of a magnetic field.</p>	<p>Pupils need to be able to use this knowledge to predict how magnets react together and the direction a current will flow within a wire.</p>	<p>Left hand rule (don't know which is their left hand)</p>	<p>To be able to read a diagram and interpret information from it.</p>	

<ul style="list-style-type: none"> <li>Year 11 Physics Assessment 3 Paper 2 mock exam</li> </ul>	Paper 2 exam content, forces, waves, electromagnetism	Knowledge needs to be applied to answer exam question	Mix up the electromagnetic spectrum. Unit conversions.	Recall information, complete calculations, analyse information	Pupils need to be able to use information to apply their knowledge to answer G.C.S.E. questions.
Year 11 assessment 4 – Paper 1 mock exam	Paper 1 exam content Energy, radioactivity, molecules of matter, electricity	Knowledge needs to be applied to answer exam questions	Structure of liquids. Re arranging equations. Energy conversions.	Recall information, complete calculations, analyse information	Pupils need to be able to use information to apply their knowledge to answer G.C.S.E. questions.

### What happens following an assessment to address pupil misconceptions and reteaching of essential knowledge?

Time is built into the curriculum after a test for the re-teaching of essential knowledge where necessary and to address common misconceptions. Individual misconceptions are addressed on feedback sheets.

### Formative Assessment in Science

Questioning, retrieval practice, class debates, assessment of written work, whiteboards.

### Feedback and Acting on Feedback (should be on the most valuable thing)

Green pen corrections, MRI section completed on the assessment label, or within the work. spellings corrected; pupils improve their answers in the lesson following the assessment.

Pupils fill in an analysis sheet after their test to celebrate what knowledge is secure but to identify where they need to improve, they then set targets for themselves on how to improve.

