Science

KS2 Prior Knowledge

- asking relevant questions and using different types of scientific enquiries to answer them
- setting up simple practical enquiries, comparative and fair tests
- making systematic and careful observations and, where appropriate, taking accurate measurements using standard units, using a range of equipment, including thermometers and data loggers
- gathering, recording, classifying and presenting data in a variety of ways to help in answering questions
- recording findings using simple scientific language, drawings, labelled diagrams, keys, bar charts, and tables
- reporting on findings from enquiries, including oral and written explanations, displays or presentations of results and conclusions
- using results to draw simple conclusions, make predictions for new values, suggest improvements and raise further questions
- identifying differences, similarities or changes related to simple scientific ideas and processes
- using straightforward scientific evidence to answer questions or to support their findings.
- planning different types of scientific enquiries to answer questions, including recognising and controlling variables where necessary
- taking measurements, using a range of scientific equipment, with increasing accuracy and precision, taking repeat readings when appropriate
- recording data and results of increasing complexity using scientific diagrams and labels, classification keys, tables, scatter graphs, bar and line graphs
- using test results to make predictions to set up further comparative and fair tests
- reporting and presenting findings from enquiries, including conclusions, causal relationships and explanations of and degree of trust in results, in oral and written forms such as displays and other presentations
- identifying scientific evidence that has been used to support or refute ideas or arguments.

Year 7	Year 8	Year 9	Year 10	Year 11
Content				
<u>Biology</u> Introduction to cells, body systems and reproduction <u>Chemistry</u> Elements, states of matter and chemical reactions <u>Physics</u> Introduction to forces, space and properties of waves	<u>Biology</u> Health, ecosystems and how organisms are adapted <u>Chemistry</u> Separation techniques, the periodic table including metals, non metals and the structure of the earth. <u>Physics</u> Electricity, energy and motion	<u>Biology</u> Cells Enzymes Transport Digestive system <u>Chemistry</u> Balance chemical equations. Compounds and mixtures Separation techniques Bonding Chromatograms Relative atomic mass and relative formula mass. Extraction of metals <u>Physics</u> The energy stores model Work done Heating and cooling processes Renewable resources Electricity	<u>Biology</u> The immune system Reflex arc Photosynthesis and respiration Asexual and sexual reproduction <u>Chemistry</u> Hydrocarbons (alkanes) Reactivity series Catalysts Chromatograms <u>Physics</u> Electromagnetic waves Wave properties Vectors and scalars Balanced and unbalanced forces Distance-time graphs and velocity time graphs	<u>Biology</u> Ecosystems Deforestation The carbon cycle Variation Evolution Natural selection The kidney <u>Chemistry</u> The Haber process Volcanic activity Different material types <u>Physics</u> Pressure Radiation Magnetic field

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Skills-Understanding the applications and implications of science				
Describe some simple positive and negative consequences of scientific and technological developments Recognise applications of specific scientific ideas Identify aspects of science used within particular jobs or roles	Describe different viewpoints a range of people may have about scientific or technological developments Indicate how scientific or technological developments may affect different groups of people in different ways Identify ethical or moral issues linked to scientific or technological Developments Link applications of science or technology to their underpinning scientific ideas	Describe how different decisions on the uses of scientific and technological developments may be made in different economic, social or cultural contexts Explain how societies are affected by particular scientific applications or ideas Describe how particular scientific or technological developments have provided evidence to help scientists pose and answer further questions Describe how aspects of science are applied in particular jobs or roles	Suggest ways in which scientific and technological developments may be influenced Explain how scientific discoveries can change worldviews Suggest economic, ethical/moral, social or cultural arguments for and against scientific or technological developments Explain how creative thinking in science and technology generates ideas for future research and development	Describe ways in which the values of a society influence the nature of the science developed in that society or period of history Evaluate the effects of scientific or technological developments on society as a whole Explain the unintended consequences that may arise from scientific and technological developments Make balanced judgements about particular scientific or technological developments by evaluating the economic, ethical/ moral, social or cultural implications
Skills - Communicating and collaborating in science				
Select appropriate ways of presenting scientific data Use appropriate scientific forms of language to communicate scientific ideas, processes or phenomena Use scientific and mathematical conventions when communicating information or ideas	Distinguish between opinion and scientific evidence in contexts related to science, and use evidence rather than opinion to support or challenge scientific arguments Decide on the most appropriate formats to present sets of scientific data, such as using line graphs for continuous variables Use appropriate scientific and mathematical conventions and terminology to communicate abstract ideas	Identify lack of balance in the presentation of information or evidence Choose forms to communicate qualitative or quantitative data appropriate to the data and the purpose of the communication Distinguish between data and information from primary sources, secondary sources and simulations, and present them in the most appropriate form	Explain how information or evidence from various sources may been manipulated in order to influence interpretation Effectively represent abstract ideas using appropriate symbols, flow diagrams and different kinds of graphs in presenting explanations and arguments Explain how scientists with different specialisms and skills have contributed to particular scientific or technological developments	Critically evaluate information and evidence from various sources, explaining limitations, misrepresentation or lack of balance Present robust and well structured explanations, arguments or counter arguments in a variety of ways Suggest the specialisms and skills that would be needed to solve particular scientific problems or to generate particular new scientific or technological developments
Skills - Using investigative approaches				
Decide when it is appropriate to carry out fair tests in investigations Select appropriate equipment or information sources to address specific questions or ideas under investigation Make sets of observations or measurements, identifying the ranges and intervals used Identify possible risks to themselves and others	Recognise significant variables in investigations, selecting the most suitable to investigate Explain why particular pieces of equipment or information sources are appropriate for the questions or ideas under investigation Repeat sets of observations or measurements where appropriate, selecting suitable ranges and intervals Make, and act on, suggestions to control obvious risks to themselves and others	Apply scientific knowledge and understanding in the planning of investigations, identifying significant variables and recognising which are independent and which are dependent Justify their choices of data collection method and proposed number of observations and measurements Collect data choosing appropriate ranges, numbers and values for measurements and observations Independently recognise a range of familiar risks and take action to control them	Formulate questions or ideas that can be investigated by synthesising information from a range of sources Identify key variables in complex contexts, explaining why some cannot readily be controlled and planning appropriate approaches to investigations to take account of this Explain how to take account of sources of error in order to collect reliable data Recognise the need for risk assessments and consult, and act on, appropriate sources of information	Justify their choice of strategies for investigating different kinds of scientific questions, using scientific knowledge and understanding Choose and justify data collection methods that minimise error, and produce precise and reliable data Adapt their approaches to practical work to control risk by consulting appropriate resources and expert advice

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Skils-Working critically with evidence				
Identify patterns in data presented in various formats, including line graphs Draw straightforward conclusions from data presented in various formats identify scientific evidence they have used in drawing conclusions Suggest improvements to their working methods, giving reasons	Interpret data in a variety of formats, recognising obvious inconsistencies Provide straightforward explanations for differences in repeated observations or measurements Draw valid conclusions that utilise more than one piece of supporting evidence, including numerical data and line graphs Evaluate the effectiveness of their working methods, making practical suggestions for improving them	Suggest reasons based on scientific knowledge and understanding for any limitations or inconsistencies in evidence collected Select and manipulate data and information and use them to contribute to conclusions Draw conclusions that are consistent with the evidence they have collected and explain them using scientific knowledge and understanding Make valid comments on the quality of their data	Explain how data can be interpreted in different ways and how unexpected outcomes could be significant Identify quantitative relationships between variables, using them to inform conclusions and make further predictions Assess the strength of evidence, deciding whether it is sufficient to support a conclusion Explain ways of modifying working methods to improve reliability	Propose scientific explanations for unexpected observations or measurements, making allowances for anomalies Process data, including using multi-step calculations and compound measures, to identify complex relationships between variables Critically interpret, evaluate and synthesise conflicting evidence Suggest and justify improvements to experimental procedures using detailed scientific knowledge and understanding and suggest
Skills-Thinking Scientifically				
Use scientific ideas when describing simple processes or phenomena Use simple models to describe scientific ideas Identify scientific evidence that is being used to support or refute ideas or arguments	Use abstract ideas or models or more than one step when describing processes or phenomena Explain processes or phenomena, suggest solutions to problems or answer questions by drawing on abstract ideas or models Recognise scientific questions that do not yet have definitive answers Identify the use of evidence and creative thinking by scientists in the development of scientific ideas	Use abstract ideas or models or multiple factors when explaining processes or phenomena Identify the strengths and weaknesses of particular models Describe some scientific evidence that supports or refutes particular ideas or arguments, including those in development Explain how new scientific evidence is discussed and interpreted by the scientific community and how this may lead to changes in scientific ideas	Make explicit connections between abstract ideas and/or models in explaining processes or phenomena Employ a systematic approach in deciding the relative importance of a number of scientific factors when explaining processes or phenomena Explain how different pieces of evidence support accepted scientific ideas or contribute to questions that science cannot fully answer Explain the processes by which ideas and evidence are accepted or rejected by the scientific community	Describe or explain processes or phenomena, logically and in detail, making use of abstract ideas and models from different areas of science Select and justify an appropriate approach to evaluating the relative importance of a number of different factors in explanations or arguments Analyse the development of scientific theories through the emergence of new, accepted ideas and evidence
Assessment				
End of unit test Higher/ Foundation. End of year test.	End of unit test Higher/ Foundation. End of year/KS3 transition test	End of unit test Higher/ Foundation if needed Year 9 PPE exam	End of unit test Higher/ Foundation. Year 10 PPE exam	End of unit test Higher/ Foundation. Year 11 PPEs