Science

Curriculum Overview

At Dixons Kings we develop students to lead successful and happy lives and make a positive contribution to their community. Our curriculum in each year is designed to provide experiences, opportunities, knowledge and skills that enrich and challenge our students. We understand that the curriculum is key to determining the life chances and choices for our students and therefore we will not compromise on providing the very best. We achieve this in science through the below:

Knowledge, skills and understanding to be gained at each stage:

		Cycle 1	Cycle 2	Cycle 3
Year 7	**Knowledge Introduced**	Unit: Science skills Theme: Repeating the same skills through different investigations Unit: Cells & Cellular Biochemistry Themes: Characteristics of living and non-living things Cell as the basic 3D unit of life Specialised cells Unicellular & multicellular organisms Movement in and out of cells The cell processes of respiration & photosynthesis Unit : Forces Themes: Defining forces & different types of force Balanced and unbalanced forces Force diagrams The effect of friction as a force Unit: Particles & Solutions Themes: Defining solid, liquids and gases and their properties in terms of particles Change in state linked to cooling curves Solutions as mixtures Separating different types of mixtures	Unit: Particles & Solutions Themes: Chromatography as a separation process Temperature and effect on solubility Unit: Energy Themes: Energy stores & transfers ensuring correct use of new terminology Useful energy transfers & energy efficiency Renewable & non renewable resources Temperature & thermal energy transfer Role of insulation in thermal energy transfer Unit: Heredity & Lifecycles Themes: Concept of heredity & lifecycles Human reproductive systems Sexual reproduction in humans including development of the foetus Sexual reproduction in plants including seeds and germination Unit: Elements & Compounds Themes : Elements, compounds, atoms & molecules Symbols & formulae Chemical reactions and conservation of mass Atomic structure Periodic table & groups	Unit: Acids & Alkalis Themes: Defining acids and alkalis The role of indicators and different indicators Neutralisation & salt production Uses of neutralisation Unit: Organisms & their Environment Themes: Food chains and webs and what they show Biotic & abiotic factors Predator prey relationships Population changes and factors affecting these Estimating population size Measuring distribution across a transect and links to abiotic & biotic factors Bioaccumulation Environmental change Biodiversity Unit: Light Sound & Waves Themes: Light & sound waves Reflection and refraction of light Colour The eye Absorption & reflection of sound The ear Volume & pitch

		Metals & non metals	
Knowledge Revisited	Unit : Science Skills The same skills are covered through four different investigations so the skills can be applied in different contexts	Unit: Heredity & Lifecycles Cell structure and specialised cells revisited linked to sperm & eggs Unit : Elements & Compounds Mixtures revisited when learning compounds	
Skills Introduced	Carrying out investigations to test hypotheses Identifying and using a wide range of scientific equipment safely & accurately Identifying independent, dependent & control variables Taking accurate measurements and observations using a range of instruments Recording measurements/observations effectively in tables Recording data in bar charts and line graphs Creating tables, bar charts and line graphs to record data Drawing lines of best fit on line graphs Identifying trends in data Calculating the mean from a range of results Using scientific knowledge to explain results and draw conclusions	Predicting further patterns based on trends seen Identifying anomalous results and sources of error in an experiment Evaluation of an investigation identifying improvements that could be made Using their scientific knowledge to explain the results seen Analysis and synthesis of results from a number of experiments to produce a scientific conclusion Calculating the mean from a range of results Performing simple calculations	Measuring angles
Skills Revisited		Carrying out investigations to test hypotheses Identifying and using a wide range of scientific equipment safely & accurately Identifying independent, dependent & control variables Taking accurate measurements and observations using a range of instruments Recording measurements/observations effectively in tables Recording data in bar charts and line graphs	Carrying out investigations to test hypotheses Identifying and using a wide range of scientific equipment safely & accurately Identifying independent, dependent & control variables Taking accurate measurements and observations using a range of instruments Recording measurements/observations effectively in tables Recording data in bar charts and line graphs

			Creating tables, bar charts and line graphs to record data Drawing lines of best fit on line graphs Identifying trends in data	Creating tables, bar charts and line graphs to record data Drawing lines of best fit on line graphs Identifying trends in data Predicting further patterns based on trends seen Identifying anomalous results and sources of error in an experiment Evaluation of an investigation identifying improvements that could be made Using scientific knowledge to explain results and draw conclusions Analysis and synthesis of results from a number of experiments to produce a scientific conclusion Calculating the mean from a range of results Performing simple calculations
Year 8	**Knowledge Introduced**	Unit: Cells to organ systems Unit : Metals and reactivity Unit: Forces and motion Unit: Health and disease	Unit: Chemical reactions Unit: Electricity and magnetism Unit: Variation, adaptation and evolution	Unit: Plants Unit: Earth and atmosphere Unit: Properties of matter
	Knowledge Revisited	Unit : Cells to organ system Spacing diffusion before students learn about respiratory system. Unit : Metals and reactivity Spacing atoms, compounds and formulae before students learn about word and symbol equations. Unit: Forces and motion Spacing forces before students learn about weight and mass. Spacing balanced and unbalanced forces before students learn about Hooke's law. Unit: Health and disease Spacing cell specialisation before students learn about white blood cells and disease.	Unit : Chemical reactions Spacing elements and compounds before students learn about chemical reactions. Unit : Cells to organ system Spacing conservation of mass before students learn about rates of reaction. Unit : Variation, adaptation & evolution Spacing inheritance before students learn about variation, continuous and evolution. Unit : Cells to organ system Spacing sexual reproduction before students learn about natural selection.	Unit : Plants Spacing diffusion before students learn about gas exchange in leaves. Unit : Plants Spacing exchanges of substances before students learn about active transport in root hair cells.

	Skills Introduced			
	Skills Revisited	Carrying out investigations to test hypotheses Identifying and using a wide range of scientific equipment safely & accurately Identifying independent, dependent & control variables Taking accurate measurements and observations using a range of instruments Recording measurements/observations effectively in tables Recording data in bar charts and line graphs Creating their tables, bar charts and line graphs to record data Drawing lines of best fit on line graphs Identifying trends in data Calculating the mean from a range of results. Using scientific knowledge to explain results and draw conclusions	Drawing lines of best fit on line graphs Identifying trends in data Predicting further patterns based on trends seen Identifying anomalous results and sources of error in an experiment Evaluation of an investigation identifying improvements that could be made Using their scientific knowledge to explain the results seen Analysis and synthesis of results from a number of experiments to produce a scientific conclusion Calculating the mean from a range of results Performing simple calculations	Carrying out investigations to test hypotheses Identifying and using a wide range of scientific equipment safely & accurately Identifying independent, dependent & control variables Taking accurate measurements and observations using a range of instruments Recording measurements/observations effectively in tables Recording data in bar charts and line graphs Creating their tables, bar charts and line graphs to record data Drawing lines of best fit on line graphs Identifying trends in data Predicting further patterns based on trends seen Identifying anomalous results and sources of error in an experiment Evaluation of an investigation identifying improvements that could be made Using their scientific knowledge to explain the results seen Analysis and synthesis of results from a number of experiments to produce a scientific conclusion Calculating the mean from a range of results Performing simple calculations Measuring angles
Year 9	**Knowledge Introduced**	P1 Energy B1 Cell Biology C1 Atomic structure C2 bonding, structure and the property of matter	B2 Organisation P3 Particle model of matter B3 Infection and response P4 Atomic structure	B4 Bioenergetics C9 Chemistry of the atmosphere C3 Quantitative chemistry

Knowledge Revisited		Spacing Photosynthesis and respiration Spacing States of matter Spacing Prokaryotic and eukaryotic cells Spacing Size and mass of atoms	Spacing cells structure and gas exchange Spacing Atomic structure
Skills Introduced	Recognise and use expressions in decimal form Recognise and use expressions in standard form Use ratios, fractions and percentages Make estimates of the results of simple calculations Use an appropriate number of significant figures Construct and interpret frequency tables and diagrams, bar charts and histograms Make order of magnitude calculations Understand and use the symbols: =, <>, >, ∝ , ~ Change the subject of an equation Substitute numerical values into algebraic equations using appropriate units for physical quantities Solve simple algebraic equations Translate information between graphical and numeric form Understand that y = mx + c represents a linear relationship Plot two variables from experimental or other data Determine the slope and intercept of a linear graph Visualise and represent 2D and 3D forms including two dimensional representations of 3D objects Calculate areas of triangles and rectangles, surface areas and volumes of cubes Plan experiments or devise procedures to make observations, produce or	Understand the principles of sampling as applied to scientific data Use a scatter diagram to identify a correlation between two variables Carry out experiments appropriately having due regard for the correct manipulation of apparatus, and health and safety considerations Present a graph of amylase activity against pH. Translate numeric data into graphical form Explain everyday and technological applications of science; evaluate associated personal, social, economic and environmental implications; and make decisions based on the evaluation of evidence and arguments. Recognise the importance of peer review of results and of communicating results to a range of audiences. Interpreting observations and other data (presented in verbal, diagrammatic, graphical, symbolic or numerical form), including identifying patterns and trends, making inferences and drawing conclusions.	Use scientific vocabulary, terminology and definitions. Recognise the importance of scientific quantities and understand how they are determined. Presenting reasoned explanations including relating data to hypotheses.

	characterise a substance, test hypotheses, check data or explore phenomena. Apply a knowledge of a range of techniques, instruments, apparatus, and materials to select those appropriate to the experiment. Use the theory of osmosis to create hypotheses on plant tissue. Plan experiments to test hypotheses. Make and record observations and measurements of mass. Evaluate the method and suggest possible improvements and further investigations. Present observations and other data in graphical form. Translate mass data into graphical form. Use simple compound measures of rate of water uptake. Use percentiles and calculate percentage gain and loss of mass of plant tissue. Find mean mass of plant tissue. Plot, draw and interpret appropriate graphs Understand how scientific methods and theories develop over time. Use a variety of models such as representational, spatial, descriptive, computational and mathematical to solve problems, make predictions and to develop scientific explanations and understanding of familiar and unfamiliar facts. Appreciate the power and limitations of science and consider any ethical issues which may arise. Evaluate risks both in practical science and the wider societal context, including perception of risk	

	in relation to data and consequences. Plan experiments or devise procedures to make observations, produce or characterise a substance, test hypotheses, check data or explore phenomena. Apply a knowledge of a range of techniques, instruments, apparatus, and materials to select those appropriate to the experiment. Use SI units (eg kg, g, mg; km, m, mm; kJ, J) and IUPAC chemical nomenclature unless inappropriate. Use prefixes and powers of ten for orders of magnitude (eg tera, giga, mega, kilo, centi, milli, micro and nano). Interconvert units. Use an appropriate numb		
Skills Revisited		Recognise and use expressions in decimal form Recognise and use expressions in standard form Use ratios, fractions and percentages Construct and interpret frequency tables and diagrams, bar charts and histograms Change the subject of an equation Substitute numerical values into algebraic equations using appropriate units for physical quantities. Solve simple algebraic equations Translate information between graphical and numeric form Use scientific vocabulary, terminology and definitions. Plan experiments or devise procedures to make observations, produce or characterise a substance, test hypotheses, check data or explore phenomena. Apply a knowledge of a range of techniques, instruments,	Recognise and use expressions in decimal form Recognise and use expressions in standard form Use ratios, fractions and percentages Use an appropriate number of significant figures Construct and interpret frequency tables and diagrams, bar charts and histograms Understand and use the symbols: =, <>, >, ∝ , ~ Change the subject of an equation Substitute numerical values into algebraic equations using appropriate units for physical quantities (chemistry and physics questions only) Solve simple algebraic equations (biology and physics Translate information between graphical and numeric form Plot two variables from experimental or other data

			apparatus, and materials to select those appropriate to the experiment. Use the theory of osmosis to create hypotheses on plant tissue. Plan experiments to test hypotheses. Make and record observations and measurements of mass. Evaluate the method and suggest possible improvements and further investigations. Present observations and other data in graphical form. Use prefixes and powers of ten for orders of magnitude (eg tera, giga, mega, kilo, centi, milli, micro and nano).	Use a variety of models such as representational, spatial, descriptive, computational and mathematical to solve problems, make predictions and to develop scientific explanations and understanding of familiar and unfamiliar facts. Appreciate the power and limitations of science and consider any ethical issues which may arise. Evaluate risks both in practical science and the wider societal context, including perception of risk in relation to data and consequences. Recognise the importance of peer review of results and of communicating results to a range of audiences. Representing distributions of results and make estimations of uncertainty. Interpreting observations and other data (presented in verbal, diagrammatic, graphical, symbolic or numerical form), including identifying patterns and trends, making inferences and drawing conclusions Use SI units (eg kg, g, mg; km, m, mm; kJ, J) and IUPAC chemical nomenclature unless inappropriate. Use prefixes and powers of ten for orders of magnitude (eg tera, giga, mega, kilo, centi, milli, micro and nano). Interconvert units. Use an appropriate number of significant figures in calculation.
Year 10	**Knowledge Introduced**	P2 Electricity B5 Homeostasis and response	C4 Chemical changes B6 Inheritance, variation and evolution C5 Energy changes C6 Rate and Extent of Chemical Change	P5 Forces C7 Organic Chemistry B7 Ecology
	Knowledge Revisited	C3 Quantitative chemistry Spacing Circulatory system Spacing Ionic bonding	Spacing Mitosis	Spacing Energy store calculations

			Spacing Separating soluble salts Spacing C9 Chemistry of the atmosphere
Skills Introduced	Draw and use the slope of a tangent to a curve as a measure of rate of change	Understand simple probability	Use angular measures in degrees Visualise and represent 2D and 3D forms including two dimensional representations of 3D objects Understand the terms mean, mode and median
Skills Revisited	Understand how scientific methods and theories develop over time. Use a variety of models such as representational, spatial, descriptive, computational and mathematical to solve problems, make predictions and to develop scientific explanations and understanding of familiar and unfamiliar facts. Appreciate the power and limitations of science and consider any ethical issues which may arise. Explain everyday and technological applications of science; evaluate associated personal, social, economic and environmental implications; and make decisions based on the evaluation of evidence and arguments. Interconvert units	Understand how scientific methods and theories develop over time. Use a variety of models such as representational, spatial, descriptive, computational and mathematical to solve problems, make predictions and to develop scientific explanations and understanding of familiar and unfamiliar facts. Appreciate the power and limitations of science and consider any ethical issues which may arise. Explain everyday and technological applications of science; evaluate associated personal, social, economic and environmental implications; and make decisions based on the evaluation of evidence and arguments. Interconvert units. Recognise and use expressions in decimal form Use ratios, fractions and percentages Make estimates of the results of simple calculations Construct and interpret frequency tables and diagrams, bar charts and histograms Make order of magnitude calculations Translate information between graphical and numeric form Understand that y = mx + c represents a linear relationship	Use a variety of models such as representational, spatial, descriptive, computational and mathematical to solve problems, make predictions and to develop scientific explanations and understanding of familiar and unfamiliar facts. Explain everyday and technological applications of science; evaluate associated personal, social, economic and environmental implications; and make decisions based on the evaluation of evidence and arguments Evaluate risks both in practical science and the wider societal context, including perception of risk in relation to data and consequences. Recognise the importance of peer review of results and of communicating results to a range of audiences Carrying out and represent mathematical and statistical analysis. Interpreting observations and other data (presented in verbal, diagrammatic, graphical, symbolic or numerical form), including identifying patterns and trends, making inferences and drawing conclusions. Being objective, evaluating data in terms of accuracy, precision, repeatability and reproducibility and identifying potential sources of random and systematic error.

			Plot two variables from experimental or other data Determine the slope and intercept of a linear graph Draw and use the slope of a tangent to a curve as a measure of rate of change. Understand the physical significance of area between a curve and the x-axis and measure it by counting squares as appropriate	Recognise the importance of scientific quantities and understand how they are determined. Interconvert units. Recognise and use expressions in decimal form Use ratios, fractions and percentages Make estimates of the results of simple calculations Find arithmetic means Construct and interpret frequency tables and diagrams, bar charts and histograms Understand the principles of sampling as applied to scientific data (biology questions only) Translate information between graphical and numeric form Understand that y = mx + c represents a linear relationship Plot two variables from experimental or other data Determine the slope and intercept of a linear graph Draw and use the slope of a tangent to a curve as a measure of rate of change (chemistry and physics questions only) Understand the physical significance of area between a curve and the x-axis and measure it by counting squares as appropriate Calculate areas of triangles and rectangles, surface areas and volumes of cubes
Year 11	**Knowledge Introduced**	C10 Using resources P6 Waves P7 Magnetism and electromagnetism		
	Knowledge Revisited	Spacing Separation techniques		
	Skills Introduced	Translating data from one form to another.		

	Make and record observations and measurements using a range of apparatus and methods. Evaluate methods and suggest possible improvements and further investigations.		
Skills Revisited	Presenting observations and other data using appropriate methods. Plan experiments or devise procedures to make observations, produce or characterise a substance, test hypotheses, check data or explore phenomena. Explain everyday and technological applications of science; evaluate associated personal, social, economic and environmental implications; and make decisions based on the evaluation of evidence and arguments. Appreciate the power and limitations of science and consider any ethical issues which may arise Use a variety of models such as representational, spatial, descriptive, computational and mathematical to solve problems, make predictions and to develop scientific explanations and understanding of familiar and unfamiliar facts. Use ratios, fractions and percentages Make estimates of the results of simple calculations Recognise and use expressions in decimal form Change the subject of an equation Substitute numerical values into algebraic equations using appropriate units for physical quantities questions Solve simple algebraic equations Translate information between graphical and numeric form		

A powerful, knowledge-rich curriculum teaches both declarative knowledge (facts; knowing that something is the case; what we think about) and non-declarative or procedural knowledge (skills and processes; knowing how to do something; what we think with). There are no skills without bodies of knowledge to underpin them. In some subjects, a further distinction can be made between substantive knowledge (the domain specific knowledge accrued e.g. knowledge of the past) and disciplinary knowledge (how the knowledge is accrued e.g. historical reasoning). Please refer to the DAT Curriculum Principles, published on our website, for further information about how we have designed our curriculum.