

MATHS: FIVE YEAR CURRICULUM MAP (FOUNDATION)

CHASE TERRACE ACADEMY

INTRODUCTION & CURRICULUM INTENT

At Chase Terrace Academy we aspire for all of our students to achieve greater things than they ever thought possible.

We pride ourselves on being a warm and welcoming school that places community at the heart of everything we do. Our ambitious curriculum is enriching and inclusive, providing challenge and breadth for all. This empowers our students to become compassionate, confident and creative individuals who are resilient, respectful and equipped with a desire to take up a fulfilling role in society and the wider world.

In Mathematics, our aim is to see every Chase Terrace student enjoy and succeed at Maths, from mastering key techniques to more advanced problem-solving and mathematical thinking, meeting plenty of real-life skills along the way. We strive to develop students' confidence in their own abilities, and encourage them to challenge themselves and to develop as independent learners.

This curriculum is designed to provide full coverage of the National Curriculum at KS3 and KS4. There is no fixed point of transition between the key stages: learning is structured over the full five years to provide a natural development of skills and knowledge, interlinking of different areas of maths, interleaving of previously-met mathematical content, and challenge for all learners.

Our two curriculum maps, titled 'Higher' and 'Foundation', give an indication of how the journey might look for a student who ends up taking a Higher or Foundation tier GCSE. However, the path is not fixed: regular formative and summative assessment are used to ensure that each student is encountering the right learning for them at each stage, providing ample opportunity to move between 'tiers', right up to Year 11.

Further detail to inform application of the curriculum is provided in the individual schemes of work.

SUBJECT CONTENT (Ctrl-Click to follow hyperlink)

NUMBER	RATIO & PROPORTION	ALGEBRA	GEOMETRY & MEASURES	STATISTICS	PROBABILITY
Place Value Approximation Integer Arithmetic Calculators Order of Operations Negatives Decimals Fractions Percentage FDP Conversion Multiples, Factors & Primes Powers	Ratio Growth Proportion	Vocab & Notation Expressions Brackets Functions Graphs Formulae Equations Inequalities Sequences	2D Shape Congruence & Similarity Transformation Perimeter, Area, Volume Angles 3D Solids Units Construction	Collection Statistics Charts	Probability

KEY TO COLOUR CODING

		SCHEME OF WORK	NATIONAL CURRICULUM KS3	NATIONAL CURRICULUM KS4	OCR GCSE SPECIFICATION
STRAND	YEAR	BLACK: Content of Y7-11 Schemes of Work PURPLE: Objectives from KS2 Programme of Study	GREEN: Objectives from KS3 Programme of Study BLACK: Additional notes for clarification	RED: Objectives from KS4 Programme of Study: Content that should taught to all pupils BLACK: Additional notes for clarification	BLUE: OCR 'Initial learning for this qualification will enable learners to' BLUE/UNDERLINED: OCR 'Foundation tier learners should also be able to' BLACK: Additional notes for clarification

AIMS OF THE NATIONAL CURRICULUM

The national curriculum for mathematics aims to ensure that all pupils:-

- become **fluent** in the fundamentals of mathematics, including through varied and frequent practice with increasingly complex problems over time, so that pupils develop conceptual understanding and the ability to recall and apply knowledge rapidly and accurately
- **reason mathematically** by following a line of enquiry, conjecturing relationships and generalisations, and developing an argument, justification or proof using mathematical language
- can **solve problems** by applying their mathematics to a variety of routine and non-routine problems with increasing sophistication, including breaking down problems into a series of simpler steps and persevering in seeking solutions

		SCHEME OF WORK	NATIONAL CURRICULUM KS3	NATIONAL CURRICULUM KS4	OCR GCSE SPECIFICATION
PLACE VALUE & ORDERING	NC Y5	Count forwards/backwards in powers of 10 for any given number up to 1 million Read/write/order/compare numbers to 1 million Read Roman numerals to 1000 and recognise years Relate thousandths to tenths and hundredths			
	NC Y6	Understand and use place value in numbers to 10 million Read/write/order/compare numbers up to 10 million			
	Y7	Represent/understand integers in a dot place-value chart Identify the value of each digit in an integer of any size; understand the need for placeholder zeros Write large integers in words and figures Use integers given in words e.g. find five thousand more than 2 103 600 Find the value of each interval on an integer number line Understand that there are infinitely many positive integers, and infinitely many decimal numbers between each pair of integers Position integers on a number line Compare integers using =, ≠, <, > Order a list of integers, including the results of calculations Understand/use place value in decimals with up to 3dp Position decimals on a number line Order decimal numbers given in words or figures Compare simple fractions, decimals and percentages: tenths, hundredths, quarters and fifths Compare fractions using simple equivalent fractions Compare and order directed numbers	Use the number line as a model for ordering of the real numbers Appreciate the infinite nature of the sets of integers, real and rational numbers Understand and use place value for decimals, measures and integers of any size Use the symbols =, ≠, <, >, ≤, ≥ to compare numbers Order positive and negative integers, decimals and fractions		Use <, >, ≤, ≥, =, ≠ Understand and use place value in integers Understand and use place value in decimals
	Y8	Order numbers given in standard form	Interpret and compare numbers in standard form $A \times 10^n$ $1 \leq A < 10$, where n is a positive or negative integer or zero		
	Y9	Order combinations of fractions, decimals and percentages	Order positive and negative integers, decimals and fractions, and combinations of these		Order integers, fractions, decimals and percentages, and combinations of these, including negative values
	Y10				
	Y11				

		SCHEME OF WORK	NATIONAL CURRICULUM KS3	NATIONAL CURRICULUM KS4	OCR GCSE SPECIFICATION
ROUNDING, ESTIMATING & CHECKING	NC Y5	Round any number up to 1 million to the nearest 10, 100, 1000, 10 000, 100 000 Round decimals with 2 decimal digits to the nearest integer or 1dp Use rounding to check answers and determine levels of accuracy			Round answers to an appropriate level of accuracy
	NC Y6	Round any whole number to a required degree of accuracy Use estimation to check answers and determine levels of accuracy Solve problems which require answers to be rounded to specific degrees of accuracy			
	Y7	Round integers to the nearest 10, 100, 1000, ..., 1 million Round integers and decimals to 1sf and the nearest integer Make a sensible estimate for each value in a simple calculation; decide whether the answer will be an under-estimate or over-estimate Use estimation to check answers	Use approximation through rounding to estimate answers Round numbers and measures to an appropriate degree of accuracy e.g. to a number of decimal places or significant figures		Know that addition and subtraction, multiplication and division, and powers and roots, are inverse operations and use this to simplify and check calculations Estimate or check, without a calculator, the result of a calculation by using suitable approximations Round numbers to the nearest whole number, ten, hundred, etc.
	Y8	REVISE rounding integers to the nearest 10, 100, 1000, ..., 1 million REVISE rounding integers and decimals to 1sf and to the nearest integer Round to any number of decimal places Estimate by rounding to 1sf, including squaring and cubing			Round numbers to a given number of decimal places
	Y9	Round to any number of significant figures Estimate the answer to a calculation involving powers/roots; use the symbol \approx			Round numbers to a given number of significant figures Estimate or check, without a calculator, the result of more complex calculations including roots Use the symbol \approx appropriately
	Y10	Identify the bounds or error interval for a continuous quantity that has been rounded to the nearest integer, 10, 100, 5, 20, etc. Solve simple bounds problems involving one rounded quantity Truncate to a given number of decimal places; understand the difference between truncating and rounding Write an error interval for a value that has been truncated Estimate the answer to calculation involving dividing by a decimal between 0 and 1 (e.g. 0.43)	Calculate possible resulting errors expressed using inequality notation $a < x \leq b$	Apply and interpret limits of accuracy when rounding or truncating	Use inequality notation to write down an error interval for a number or measurement rounded or truncated to a given degree of accuracy Apply and interpret limits of accuracy
	Y11	REVISE identifying bounds and error intervals for both discrete and continuous quantities which have been rounded or truncated to the nearest integer, 10, 100, 5, 20, or a given number of decimal places or significant figures			

		SCHEME OF WORK	NATIONAL CURRICULUM KS3	NATIONAL CURRICULUM KS4	OCR GCSE SPECIFICATION
FOUR OPERATIONS WITH INTEGERS	NC Y5	<p>Add/subtract mentally with increasingly large numbers</p> <p>Add/subtract numbers with more than 4 digits</p> <p>Solve multi-step addition/subtraction problems in context, choosing operations and methods</p> <p>Add/subtract mentally using known facts</p> <p>Multiply up to ThHTU x TU on paper</p> <p>Divide up to ThHTU ÷ U using short division; interpret remainders appropriately for the context</p> <p>Multiply/divide by 10, 100, 1000</p>			
	NC Y6	<p>Perform mental calculations, including with mixed operations and large numbers</p> <p>Solve multi-step addition/subtraction problems in context, choosing operations and methods</p> <p>Perform mental calculations, including with mixed operations and large numbers</p> <p>Multiply up to ThHTU x TU using long multiplication</p> <p>Divide up to ThHTU ÷ TU</p> <p>Interpret remainders appropriately according to the context</p> <p>Divide where the answer has up to 2dp</p>			
	Y7	<p>Understand equality represented by numerical equations e.g. $5 + 6 = 8 + 3$</p> <p>Find fact families for numerical bar models</p> <p>Understand/recognise the commutative and associative properties relating to the four operations</p> <p>Use a range of mental strategies to add/subtract/multiply/divide integers e.g. 43×9</p> <p>Add and subtract integers up to a million using column methods; use this to solve 1-step equations</p> <p>Decide whether a written, mental or calculator method would be best for a given calculation</p> <p>Multiply and divide integers by 10, 100 or 1000</p> <p>Multiply integers up to HTU x TU using long multiplication</p> <p>Divide by U or TU with an integer or simple terminating decimal answer</p> <p>Split division into multiple steps e.g. $\div 24$ using $\div 6$ then $\div 4$</p> <p>Use factors to simplify multiplication e.g. $16 \times 20 = 16 \times 2 \times 10$</p> <p>Use a number fact to derive others e.g. 23×21 given 23×42</p>			<p>Understand and use the terms odd, even</p> <p>Use non-calculator methods to calculate the sum, difference, product and quotient of positive and negative whole numbers</p>
	Y8	REVISE earlier skills by practising in context – opportunities highlighted within scheme of work			
	Y9	REVISE earlier skills by practising in context – opportunities highlighted within scheme of work			
	Y10	REVISE earlier skills by practising in context – opportunities highlighted within scheme of work			
	Y11	REVISE earlier skills by practising in context – opportunities highlighted within scheme of work			

		SCHEME OF WORK	NATIONAL CURRICULUM KS3	NATIONAL CURRICULUM KS4	OCR GCSE SPECIFICATION
USE OF A CALCULATOR	NC Y5				
	NC Y6				
	Y7	Use a calculator, where appropriate, in FDP conversion Use a calculator with directed numbers and decimals Use the FACT function on a scientific calculator to check a prime factorisation Use a calculator to convert between mixed numbers and improper fractions	Use a calculator and other technologies to calculate results accurately and then interpret them appropriately		
	Y8	Use a calculator to calculate percentages, and the result of a percentage change Use a calculator to convert more complex fractions to decimals e.g. $\frac{38}{50}$ Use the memory on a calculator (in the context of standard form calculations) Enter standard form numbers into a calculator and display answers in standard form Use the π button			
	Y9	Use a scientific calculator with negative numbers Use a scientific calculator with fractions, both positive and negative Use a calculator to change any fraction to a decimal			
	Y10	Use a calculator to evaluate numerical expressions involving powers and roots Use standard form on a scientific calculator			
	Y11	Use the functionality of a scientific calculator when calculating with roots and powers Use the functions SIN, COS & TAN in calculations			

		SCHEME OF WORK	NATIONAL CURRICULUM KS3	NATIONAL CURRICULUM KS4	OCR GCSE SPECIFICATION
ORDER OF OPERATIONS	NC Y5				
	NC Y6	Use order of operations with 4 operations <u>and brackets</u>			
	Y7	Extend the order of operations to squaring and negative numbers	Use conventional notation for the priority of operations, including brackets		Know the conventional order for performing calculations involving brackets and four rules
	Y8	Extend the order of operations to reciprocals e.g. $\frac{15 + 6}{15 - 8}$	Use conventional notation for the priority of operations, including reciprocals		Know the conventional order for performing calculations involving reciprocals
	Y9	Extend the order of operations to powers and roots	Use conventional notation for the priority of operations, including powers and roots		Know the conventional order for performing calculations involving powers and roots
	Y10				
	Y11	Understand the need for careful use of brackets on a calculator in trigonometry calculations e.g. $\sin(35) \times 6$			

		SCHEME OF WORK	NATIONAL CURRICULUM KS3	NATIONAL CURRICULUM KS4	OCR GCSE SPECIFICATION
NEGATIVE NUMBERS	NC Y5	Count forwards/backwards through 0			
	NC Y6	Use negative numbers in context Calculate intervals across 0			
	Y7	Represent/interpret negative numbers visually, including on a number line, height diagram, or as coloured counters Compare and order directed numbers Perform calculations that cross zero, including in context Explore/use the patterns for adding or subtracting a negative number e.g. $-25 + -13$, $17 - -8$ Multiply and divide directed numbers e.g. -34×-17	Use the four operations applied to integers, decimals, proper and improper fractions, and mixed numbers, all both positive and negative [cf. 'Fractions' & 'Decimals']		Use non-calculator methods to calculate the sum, difference, product and quotient of positive and negative whole numbers, fractions, mixed numbers and decimals [cf. 'Fractions', 'Decimals']
	Y8	REVISE earlier skills by practising in context – opportunities highlighted within scheme of work			
	Y9	REVISE previously-met skills with directed numbers Use a scientific calculator with negative numbers			
	Y10	REVISE previously-met skills with directed numbers			
	Y11				

		SCHEME OF WORK	NATIONAL CURRICULUM KS3	NATIONAL CURRICULUM KS4	OCR GCSE SPECIFICATION
DECIMALS	NC Y5	x/÷ decimals by 10, 100 or 1000 Round decimals with 2dp to the nearest integer or 1dp Read/write/order/compare decimals with up to 3 dp			
	NC Y6	x/÷ decimals by 10, 100, 1000 with answers to 3dp Multiply 2 dp decimals by whole numbers Divide where the answer has up to 2dp Identify the value of each digit to 3dp			
	Y7	Understand/use place value in decimals with up to 3dp Position decimals on a number line Order decimal numbers given in words or figures Add/subtract decimals up to 2dp using column methods Solve financial problems including profit, loss, total cost, change, banks statements and utility bills Multiply and divide decimals by 10, 100 or 1000 Multiply integers and decimals by 0.1 and 0.01 Multiply a decimal by an integer and multiply two decimals using integer multiplication up to HTU x TU Divide a decimal by an integer, including with simple terminating decimal answers Add/subtract combinations of fractions and decimals Use mental strategies with decimals e.g. $2.3 + 2.4$ Use a given fact to derive another e.g. 2.3×4.2 from 23×42	Use addition and subtraction applied to positive and negative decimals		Understand and use place value in decimals Add and subtract decimals, including negative decimals, without a calculator
	Y8	REVISE multiplying a decimal by an integer and multiplying two decimals, mentally and using a calculator Calculate with money (including with sharing in a ratio, percentage and estimation)	Use multiplication applied to positive and negative decimals		Multiply decimals, including negative decimals, without a calculator
	Y9	Know the correct notation for recurring decimals Divide an integer/decimal by an integer where the result is a recurring decimal Divide a decimal by a decimal by transforming to division by an integer	Use division applied to positive and negative decimals		Divide a decimal by a whole number, including negative decimals, without a calculator <u>Without a calculator, divide a decimal by a decimal</u>
	Y10	Understand the equivalence of e.g. $0.24\dot{9}$ and 0.25			
	Y11				

		SCHEME OF WORK	NATIONAL CURRICULUM KS3	NATIONAL CURRICULUM KS4	OCR GCSE SPECIFICATION
FRACTIONS	NC Y5	<p>Compare/order fractions whose denominators are all multiples of the same number</p> <p>Identify equivalent fractions, represented visually, including tenths and hundredths</p> <p>Convert between mixed numbers and improper fractions</p> <p>Add/subtract fractions with the same denominator or where denominators are multiples of the same number, including answers greater than 1</p> <p>Multiply proper fractions and mixed numbers by whole numbers, supported by materials and diagrams</p> <p>Relate thousandths to tenths and hundredths</p>			
	NC Y6	<p>Add/subtract fractions with different denominators and mixed numbers, using equivalent fractions</p> <p>Multiply pairs of simple fractions</p> <p>Associate a fraction with division</p> <p>Simplify fractions using common factors</p>			
	Y7	<p>Represent/interpret fractions represented diagrammatically in a variety of forms and on number lines</p> <p>Use a hundred square to recognise equivalences between quarters, fifths, tenths and hundredths</p> <p>Shade a diagram to represent a fraction, including where the sections are irregular shapes; understand that such a diagram needs to consist of <i>equal</i> sections</p> <p>Represent tenths, hundredths, fifths and quarters on number lines</p> <p>Identify/use/find equivalent fractions, including on diagrams</p> <p>Solve increasingly difficult problems by calculating fractions of amounts; understand fractions as division</p> <p>Use mental strategies with fractions of amounts</p> <p>Find the whole, given a fraction of it</p> <p>Convert between improper fractions and mixed numbers, with and without a calculator; understand mixed numbers represented in diagrams</p> <p>Add/subtract fractions with the same and different denominators</p> <p>Add/subtract a fraction to/from an integer</p> <p>Add/subtract with mixed numbers and with combinations of fractions and decimals</p> <p>Use fractions in simple algebraic contexts</p>	<p>Use the four operations applied to proper and improper fractions, and mixed numbers, all both positive and negative</p> <p>Interpret fractions as operators</p>	<p>Calculate exactly with fractions</p>	<p>Recognise and use equivalence between simple fractions and mixed numbers</p> <p>Calculate a fraction of a quantity</p> <p>Add and subtract simple fractions (proper and improper), including mixed numbers and negative fractions</p>
	Y8	<p>Express one quantity as a fraction of another</p> <p>Multiply an integer/fraction by a fraction</p> <p>Divide an integer/fraction by a fraction</p> <p>Know/understand the term reciprocal</p> <p>REVISE calculating fractions of amounts mentally and using a calculator</p>	<p>Express one quantity as a fraction of another where the fraction is less than 1</p>		<p>Multiply and divide simple fractions (proper and improper), including mixed numbers and negative fractions</p> <p>Express one quantity as a fraction of another</p>
	Y9	<p>Calculate fractions of amounts for fractions greater than 1</p> <p>Simplify a fraction involving an unknown or π e.g. $\frac{35\pi}{15}$</p> <p>Solve problems that require exact calculation with fractions in various contexts</p>			<p>Calculate fractions of amounts with fractions greater than 1</p>
	Y10	<p>Solve problems involving single or repeated fractional increase or decrease</p> <p>Calculate the original quantity, given the result of a fractional increase or decrease</p>	<p>Express one quantity as a fraction of another where the fraction is greater than 1</p>		<p>Use fractions in exact calculations without a calculator</p> <p>Carry out more complex calculations, including the use of improper fractions</p>
	Y11				

		SCHEME OF WORK	NATIONAL CURRICULUM KS3	NATIONAL CURRICULUM KS4	OCR GCSE SPECIFICATION
PERCENTAGE	NC Y5	Recognise percentage as 'number of parts per 100'			
	NC Y6	Calculate percentages of quantities Use percentages to compare quantities			
	Y7	Represent/interpret percentages on a hundred square Understand/use the fact that 100% is a whole Calculate simple percentages of quantities without a calculator, focusing on multiples of 5%, including over 100% Given a simple percentage, work out the whole quantity	Define percentage as 'number of parts per hundred' Interpret percentages as operators Work with percentages greater than 100%		Understand percentage is 'number of parts per hundred' Calculate a percentage of a quantity
	Y8	REVISE calculating percentages of quantities without a calculator, focusing on multiples of 5%, including over 100% Calculate percentages of quantities using a calculator e.g. 0.35×800 Find the percentage of an increase, decrease, profit or loss Express one quantity as a percentage of another, with and without a calculator Compare two quantities using percentages	Express one quantity as a percentage of another Interpret percentages and percentage changes as a fraction or a decimal, interpret these multiplicatively Compare two quantities using percentages		Express one quantity as a percentage of another, with or without a calculator
	Y9	REVISE percentage change using a multiplier and calculator Identify the multiplier for a percentage increase or decrease when the percentage is greater than 100% Use calculators to increase an amount by a percentage greater than 100% Solve problems involving percentage change Solve original value problems when working with percentages Solve financial problems including simple interest			Calculate simple interest, including in financial contexts Increase or decrease a quantity by a simple percentage, including simple decimal or fractional multipliers; apply this to simple original value problems and simple interest <u>Express percentage change as a decimal or fractional multiplier; apply this to percentage change problems (including original value problems)</u>
	Y10	Calculate the result of a repeated percentage change, including compound interest		Set up, solve and interpret the answers in growth and decay problems, including compound interest	
	Y11				

		SCHEME OF WORK	NATIONAL CURRICULUM KS3	NATIONAL CURRICULUM KS4	OCR GCSE SPECIFICATION
FDP CONVERSION	NC Y5	<p>Read/write decimal numbers as fractions up to thousandths</p> <p>Write percentage as a fraction over 100</p> <p>Write percentage as a decimal</p> <p>Solve problems using percentage and decimal equivalents of $\frac{1}{2}$, $\frac{1}{4}$, $\frac{1}{5}$, $\frac{2}{5}$, $\frac{4}{5}$ and denominators which are multiples of 10 or 25</p>			
	NC Y6	<p>Calculate decimal equivalents to fractions</p> <p>Recall/use equivalences between simple fractions, decimals and percentages, including in different contexts</p>			
	Y7	<p>Compare fraction and decimal number lines</p> <p>Convert tenths and hundredths between decimals and fractions; continue a sequence involving a mixture of decimals and simple fractions (tenths, hundredths); perform simple calculations involving a mixture of decimals and simple fractions (tenths, hundredths)</p> <p>Convert fifths and quarters between decimals and fractions</p> <p>Use a hundred square to recognise the equivalence between percentages, tenths and hundredths</p> <p>Convert between simple fractions, decimals and percentages: tenths, hundredths, quarters, fifths</p> <p>Convert fluently between a range of fractions, terminating decimals and percentages</p> <p>Convert a fraction to a terminating or recurring decimal by division</p> <p>Know what is meant by a terminating or recurring decimal</p>	<p>Work interchangeably with terminating decimals and their corresponding fractions (such as 3.5 and $\frac{7}{2}$ or 0.375 and $\frac{3}{8}$)</p>		<p>Express a simple fraction as a terminating decimal or vice versa, without a calculator</p> <p>Convert between fractions, decimals and percentages</p> <p>Use division to convert a simple fraction to a decimal</p>
	Y8	<p>REVISE converting fluently between fractions, terminating and recurring decimals and percentages</p> <p>Convert between decimals and percentages greater than 100%</p> <p>Increase/decrease by a percentage using a multiplier and calculator</p> <p>Convert more complex fractions to decimals by division, using a calculator e.g. $\frac{58}{80}$</p>			
	Y9	<p>REVISE calculating with combinations of fractions, terminating and recurring decimals and percentages</p> <p>REVISE ordering combinations of fractions, decimals and percentages</p>			
	Y10				
	Y11				

		SCHEME OF WORK	NATIONAL CURRICULUM KS3	NATIONAL CURRICULUM KS4	OCR GCSE SPECIFICATION
MULTIPLES, FACTORS & PRIMES	NC Y5	Identify multiples & factors; find all the factor pairs of a number and common factors of two numbers Know/use vocabulary of prime/composite numbers Recall prime numbers up to 19 and establish whether a number to 100 is prime			
	NC Y6	Identify common factors, common multiples and prime numbers			
	Y7	Work out the factors of a small number Identify common factors and the HCF of two small numbers Relate factors to an array diagram List the first few multiples, and identify larger multiples, of a small number Identify common multiples and the LCM of two small numbers Justify statements involving multiples and factors Know that a prime number is a positive integer with exactly two factors; identify small primes; know that 1 is not prime Express a number as a product of primes using a factor tree, recognising that this representation is unique Use the FACT function on a scientific calculator to check a prime factorisation Use a Venn diagram to find the HCF/LCM of two larger integers	Use the concepts and vocabulary of prime numbers, factors, multiples, common factors, common multiples, highest common factor, and lowest common multiple Use prime factorisation, including using product notation and the unique factorisation property		Understand and use the terms prime, factor (divisor), multiple, common factor (divisor), common multiple Identify prime numbers less than 20 Express a whole number as a product of its prime factors e.g. $24 = 2 \times 2 \times 2 \times 3$ Understand that each number can be expressed as a product of prime factors in only one way Find the HCF and LCM of two whole numbers by listing <u>Identify prime numbers</u> <u>Use power notation in expressing a whole number as a product of its prime factors</u> <u>Find the HCF and LCM of two whole numbers from their prime factorisations</u>
	Y8				
	Y9	REVISE writing a number as a product of its prime factors and finding the HCF/LCM of two numbers Solve problems using HCF or LCM			
	Y10	Solve problems where numbers are given in prime factor form REVISE using the FACT function on a scientific calculator			
	Y11				

		SCHEME OF WORK	NATIONAL CURRICULUM KS3	NATIONAL CURRICULUM KS4	OCR GCSE SPECIFICATION
POWERS & ROOTS	NC Y5	Recognise/use square and cube numbers, knowing the notation 2 and 3			
	NC Y6				
	Y7	Understand and use square and higher powers Understand and use square root Find the integers a square root lies between e.g. $\sqrt{45}$ Investigate the sequence of square numbers	Use integer powers (square, cube and higher) Use square root Recognise powers of 2, 3, 4, 5 Distinguish between exact representations of roots and their decimal approximations	Calculate with square roots, and with integer indices	Understand and use the terms square, cube, root Recognise simple powers of 2, 3, 4 and 5 e.g. $27=3^3$ Use positive integer indices e.g. to write $2 \times 2 \times 2 \times 2$ as 2^4 Calculate positive integer powers and square roots
	Y8	Apply the index laws for multiplication and division with numerical bases Understand the effect of raising a number to power 0 Understand positive and negative powers of 10 Convert between standard form and ordinary numbers for positive and negative powers of 10 Order numbers in standard form Perform simple mental calculations involving numbers in standard form e.g. $2 \times (3 \times 10^7)$ Add/subtract numbers in standard form with the same power of 10, without a calculator; add/subtract other numbers in standard form by conversion to ordinary numbers Correct a number written badly in standard form e.g. 17×10^4 Multiply/divide numbers written in standard form Calculate in standard form using a calculator	Use real roots associated with integer powers (square, cube and higher) Interpret and compare numbers in standard form $A \times 10^n$ $1 \leq A < 10$, where n is a positive or negative integer or zero	Calculate with roots Calculate with numbers in standard form	Calculate exact roots Interpret and order numbers expressed in standard form Convert numbers to and from standard form Use a calculator to perform calculations with numbers in standard form <u>Add, subtract, multiply and divide numbers in standard form, without a calculator</u> <u>Know and apply the index laws for multiplication and division</u>
	Y9	Apply previous work on standard form, calculator and non-calculator to problems in greater context REVISE simplifying numerical expressions using the laws of indices for multiplication, division, and power 0 Apply the index law for powers of powers (brackets) Evaluate powers of -1 and other negative powers			<u>Calculate with negative integer powers</u> <u>Use negative integer indices to represent reciprocals</u> <u>Know and apply the index law for power of a power (brackets)</u>
	Y10	Evaluate expressions involving positive integer powers and small roots, without a calculator Use a calculator to evaluate numerical expressions involving powers and roots Apply previous work on standard form, calculator and non-calculator to GCSE-style problems			<u>Calculate with roots</u>
	Y11	Evaluate more complex expressions and solve problems using negative powers e.g. evaluate $5^{-2} + 2^3$			

		SCHEME OF WORK	NATIONAL CURRICULUM KS3	NATIONAL CURRICULUM KS4	OCR GCSE SPECIFICATION
RATIO	NC Y5				Understand the relationship between gradient and ratio
	NC Y6				
	Y7				
	Y8	<p>Understand ratio, linking this to pictorial representations</p> <p>Use ratio notation, and solve simple problems using ratio</p> <p>Divide a value into a given 2-part or 3-part ratio</p> <p>Simplify a ratio, including with decimals or fractions</p> <p>Understand how ratios relate to fractions</p> <p>Understand $1:\pi$ as the ratio of d:C for a circle</p> <p>Know/use the fact that corresponding lengths in similar shapes are in the same ratio</p> <p>Link enlargement scale factor to a ratio of the form 1:n</p>	<p>Use ratio notation</p> <p>Reduce a ratio to its simplest form</p> <p>Divide a given quantity into two parts in a given part:part or part:whole ratio; express the division of a quantity into two parts as a ratio</p> <p>Understand that a multiplicative relationship between two quantities can be expressed as a ratio or a fraction</p>		<p>Find the ratio of quantities in the form $a : b$ and simplify</p> <p>Split a quantity into two parts given the ratio of the parts</p> <p>Express the division of a quantity into two parts as a ratio#</p> <p>Split a quantity into three or more parts given the ratio of the parts</p>
	Y9	<p>REVISE dividing a value into a 2-part of 3-part ratio</p> <p>Use a ratio and one part to find other part(s) or the whole</p> <p>Solve simple problems given a ratio and a difference e.g. Tom has 10 more marbles than Ella</p> <p>Understand and use the connections between ratios and fractions</p> <p>Solve simple ratio problems involving comparison, mixing or concentrations</p> <p>Write ratios in the form 1:n and use this for comparison</p> <p>Solve simple problems involving combined ratios e.g. given the ratios A:B & A:C find the ratio B:C or A:B:C</p>	<p>Relate the language of ratios and the associated calculations to the arithmetic of fractions</p>	<p>Identify and work with fractions in ratio problems</p>	<p>Find the ratio of quantities in the form 1 : n</p> <p>Interpret a ratio of two parts as a fraction of a whole</p> <p>Calculate one quantity from another, given the ratio of the two quantities</p>
	Y10	<p>REVISE earlier work on dividing in a ratio, including where one part is given or the difference is given</p> <p>Solve more complex ratio problems e.g. comparison, mixing, concentrations</p> <p>Solve problems combining understanding of fractions and ratio</p> <p>Relate ratios to formulae e.g. $2y=3x$, what is $x:y$?</p>	<p>Relate the language of ratios and the associated calculations to linear functions</p>		<p>Understand the relationship between ratio and linear functions</p>
	Y11				

		SCHEME OF WORK	NATIONAL CURRICULUM KS3	NATIONAL CURRICULUM KS4	OCR GCSE SPECIFICATION
GROWTH & DECAY	NC Y5				
	NC Y6				
	Y7				
	Y8	Increase/decrease by a percentage using a multiplier and calculator Find the percentage of an increase, decrease, profit or loss			
	Y9	REVISE percentage change using a multiplier and calculator Identify the multiplier for a percentage increase or decrease when the percentage is greater than 100% Use calculators to increase an amount by a percentage greater than 100% Solve problems involving percentage change Solve original value problems when working with percentages Solve financial problems including simple interest			Calculate simple interest, including in financial contexts
	Y10	Recognise/set up a compound interest problem Calculate the result of a repeated percentage change, including compound interest Solve problems involving single or repeated fractional increase or decrease Calculate the original quantity, given the result of a fractional increase or decrease		Set up, solve and interpret the answers in growth and decay problems, including compound interest	Solve problems step-by-step involving multipliers over a given interval, for example compound interest, depreciation, etc.
	Y11	Set up and solve a simple growth or decay problem [<i>not linked to a formula at Foundation</i>]			

		SCHEME OF WORK	NATIONAL CURRICULUM KS3	NATIONAL CURRICULUM KS4	OCR GCSE SPECIFICATION
PROPORTION, SCALING & ENLARGEMENT	NC Y5	Solve problems involving scaling by simple fractions Solve problems involving simple rates			
	NC Y6	Solve problems involving the relative sizes of two quantities where missing values can be found using times tables			
	Y7	Interpret pie charts using understanding of proportion, where the chart is divided into equal portions or the angles are given			
	Y8	Solve simple direct proportion problems e.g. recipes Understand scale factors for lengths in enlarged shapes, linking this to a ratio of the form 1:n Enlarge a shape by a positive integer scale factor on a grid Draw/interpret scale diagrams Interpret map scale factors given as ratios or otherwise e.g. 1cm on the map is 4km in real life	Construct similar shapes by enlargement, with and without coordinate grids		Solve simple ratio and proportion problems e.g. adapt a recipe for 6 to serve 4 people Solve simple problems involving quantities in direct proportion, including algebraic proportions and currency conversion problems Solve simple word problems involving quantities in inverse proportion or simple algebraic proportions e.g. if speed is doubled, time is halved
	Y9	Use the centre and scale factor to carry out an enlargement with a positive integer scale factor Find the centre and scale factor of an enlargement Use scale diagrams, including maps Use the concept of scaling in diagrams Find a relevant multiplier in a situation involving proportion REVISE applying direct proportion, including recipes (no 'k') Compare lengths, areas and volumes using ratio notation Understand a relationship between two quantities which are in direct proportion Know the features of graphs and tables that represent direct proportion	Use scale factors, scale diagrams and maps Interpret scale drawings	Recognise and interpret graphs that illustrate direct proportion	Construct and interpret scale drawings Use the scale of a map Enlarge a simple shape from a given centre using a whole number scale factor, and identify the scale factor of an enlargement Recognise and interpret graphs that illustrate direct proportion
	Y10	REVISE the features of graphs and tables that represent direct proportion Know the features of graphs and tables that represent inverse proportion Construct/interpret/use a linear formula for direct or inverse proportion e.g. using $y=kx$ (no powers or roots involved) Understand that X is inversely proportional to Y is equivalent to X is proportional to $1/Y$ Understand the implications of enlargement on area and volume; move freely between scale factors for length, area and volume Enlarge a shape using a centre and fractional scale factor Find the scale factor and centre of an enlargement with fractional scale factor Solve problems which include finding the multiplier in a situation involving direct/inverse proportion	Solve problems involving direct and inverse proportion, including graphical and algebraic representations	Understand that X is inversely proportional to Y is equivalent to X is proportional to $1/Y$ Interpret equations that describe direct and inverse proportion Recognise and interpret graphs that illustrate inverse proportion Interpret and use fractional scale factors for enlargements	Solve more formal problems involving quantities in inverse proportion Recognise that if $y=k/x$ then y is inversely proportional to x Recognise and interpret graphs that illustrate inverse proportion Identify the centre and scale factor (including fractional scale factors) of an enlargement of a simple shape, and perform such an enlargement on a simple shape
	Y11				

		SCHEME OF WORK	NATIONAL CURRICULUM KS3	NATIONAL CURRICULUM KS4	OCR GCSE SPECIFICATION
ALGEBRA VOCABULARY & NOTATION	NC Y5				
	NC Y6				
	Y7	Write expressions using algebraic notation e.g. $3a$ for $a + a + a$, p^2 for $p \times p$ Understand simple expressions with brackets Understand equality represented by numerical equations e.g. $5 + 6 = 8 + 3$ Use the \equiv symbol (in the context of like terms) Make/test conjectures in number, algebra and geometry; find counterexamples to disprove conjectures	Use and interpret algebraic notation, including ab , $3y$, a^2 , a^3 , a^2b , a/b , brackets Understand and use the concepts and vocabulary of expressions, terms and equations		Understand and use the concepts and vocabulary of expressions, equations, and terms
	Y8	Distinguish between expressions, identities, equations and formulae	Understand and use the concepts and vocabulary of inequalities and factors	Know the difference between an equation and an identity	Understand and use the concepts and vocabulary of formulae, inequalities and factors Recognise the difference between an equation and an identity
	Y9	REVISE using/interpreting more complex algebraic notation, including: $a^2 b$ in place of $a \times a \times b$, coefficients written as fractions rather than as decimals; practise through areas such as substitution	Write coefficients as fractions rather than as decimals		
	Y10	Understand powers of a bracket e.g. $(x + 3)^2$			
	Y11				

		SCHEME OF WORK	NATIONAL CURRICULUM KS3	NATIONAL CURRICULUM KS4	OCR GCSE SPECIFICATION
MANIPULATING EXPRESSIONS	NC Y5				
	NC Y6				
	Y7	<p>Use algebraic expressions with single and double function machines</p> <p>Identify the function(s) of a single or double function machine with algebraic inputs and outputs e.g. input y, output xy</p> <p>Recognise/sort like and unlike terms</p> <p>Identify simple equivalent expressions using all four operations e.g. $2m \times 3$ and $6m$</p> <p>Add/subtract like and unlike terms using the \equiv symbol e.g. $2ab + 6ab - 3ab + 5a + 7$</p> <p>Identify correct identities involving all four operations using the \equiv symbol</p> <p>Test the equivalence of expressions by substitution</p> <p>Use one fact to derive another e.g. find $2a + 2b$ given $a + b$</p>	Simplify and manipulate algebraic expressions by collecting like terms		
	Y8	<p>Write an expression for the area or perimeter of a rectangle, parallelogram, triangle or circle where the lengths are given algebraically</p> <p>Add/subtract terms where manipulation of negative numbers is needed e.g. $-3p + 8 + 7p - 10$</p> <p>Simplify by multiplying terms where coefficients are negative e.g. $3 \times -4p$</p> <p>Add/subtract expressions involving different powers of the same unknown e.g. $5a^2 + 6a^2 + 2a^3$</p> <p>Multiply/divide terms involving indices e.g. $18a^2b \div 3a$</p> <p>Write non-integer coefficients as fractions rather than decimals</p> <p>Apply the index laws for multiplication and division with algebraic bases</p> <p>Understand the effect of raising an unknown or simple expression to power 0 e.g. $(15xy)^0$</p>	Model situations or procedures by translating them into algebraic expressions	Simplify expressions involving sums, products and powers, including the laws of indices	<p>Simplify algebraic expressions by collecting like terms</p> <p>Simplify algebraic products and quotients</p> <p>Apply the index laws for multiplication and division to algebraic simplification, in simple cases</p>
	Y9	<p>Simplify an expression involving terms with mixed variables e.g. $3a^2b + 4ab^2 + 2a^2 - a^2b$</p> <p>Recognise equivalent terms such as a^2b and ba^2, knowing the convention to list unknowns in alphabetical order</p> <p>REVISE simplifying algebraic expressions using the laws of indices for multiplication, division, and power 0</p> <p>Apply the index law for powers of powers (brackets)</p> <p>Manipulate expressions involving powers of -1 and other negative powers</p>			
	Y10	<p>Create a mathematical argument to show that two expressions are equivalent</p> <p>Know the difference between an equation and an identity</p> <p>Distinguish situations that can be modelled by an expression or a formula</p> <p>Create an expression to describe a situation</p>		<p>Argue mathematically to show algebraic expressions are equivalent</p> <p>Use algebra to support and construct arguments</p>	<p>Formulate simple formulae and expressions from real-world contexts</p> <p>Use algebra to construct arguments</p> <p>Show algebraic expressions are equivalent</p>
	Y11				

		SCHEME OF WORK	NATIONAL CURRICULUM KS3	NATIONAL CURRICULUM KS4	OCR GCSE SPECIFICATION
EXPANDING & FACTORISING	NC Y5				
	NC Y6				
	Y7	Find factors of a simple algebraic expression e.g. $6xy$			
	Y8	Multiply out a single bracket e.g. $3(a + 4)$, $2x(5 - x + y)$ Factorise into a single bracket e.g. $6x + 9y$, $a^2 + ab + 6a$ Expand a single bracket and multiple single brackets, including involving indices e.g. $5pq(p + q) - 2q^2(p + p^2)$	Simplify and manipulate algebraic expressions by multiplying a single term over a bracket Simplify and manipulate algebraic expressions by taking out common factors		Simplify algebraic expressions by multiplying a single term over a bracket
	Y9	REVISE expanding a single bracket and multiple single brackets, including involving indices Apply expanding brackets and factorising to simple algebraic contexts e.g. area of a rectangle Factorise an algebraic expression by taking out more complex common factors e.g. $3x$, $4x^2$, a^2b			Take out common factors to form a single bracket
	Y10	Expand and simplify a double bracket, including a perfect square e.g. $(x - 3y)^2$ Expand when more than two terms appear in a bracket e.g. $(x + 3)(x^2 + 3x - 5)$ Expand a product of three binomials in simple cases REVISE expanding multiple single brackets and applying expanding and factorising to simple algebraic contexts Factorise a quadratic expression of the form $x^2 + bx + c$ Factorise a difference of two squares of the form $x^2 - c$	Simplify and manipulate algebraic expressions by expanding products of two or more binomials	Simplify and manipulate algebraic expressions by factorising quadratic expressions of the form x^2+bx+c , including a difference of two squares	Expand product of two binomials Factorise quadratic expressions of the form x^2+bx+c
	Y11	REVISE factorising quadratic expressions of the forms $x^2 + bx + c$ and $x^2 - c$			

		SCHEME OF WORK	NATIONAL CURRICULUM KS3	NATIONAL CURRICULUM KS4	OCR GCSE SPECIFICATION
FUNCTIONS & MAPPINGS	NC Y5				
	NC Y6				
	Y7	Find inputs, outputs and functions for single and double function machines Use algebraic expressions with single and double function machines Identify the function(s) of a single or double function machine with algebra inputs and outputs e.g. input y , output xy	Interpret mathematical relationships both algebraically and graphically		
	Y8				
	Y9				
	Y10	Practise a range of (OCR) GCSE-style function questions, including finding numerical/algebraic outputs and identifying missing operations in a flow chart Use/interpret functions defined using formulae, expressions or function machines [$f(x)$ notation is not needed for OCR]		Interpret simple expressions as functions with inputs and outputs	Interpret, where appropriate, simple expressions as functions with inputs and outputs [Knowledge of function notation not required for OCR]
	Y11				

		SCHEME OF WORK	NATIONAL CURRICULUM KS3	NATIONAL CURRICULUM KS4	OCR GCSE SPECIFICATION
CO-ORDINATES & GRAPHS	NC Y5				
	NC Y6	Read/plot in all four quadrants			
	Y7	Plot a variety of graphs using graphing software Identify from an equation in terms of y whether a graph will be a straight line			
	Y8	Use/draw a conversion graph REVISE reading and plotting co-ordinates in all four quadrants Construct axes, labelling the 1st, 2nd, 3rd & 4th quadrants Identify/understand the equations of lines parallel to the axes Recognise/use the lines $y = x$ Plot line graphs of the forms $y = kx$, $y = -kx$, $y = x \pm a$, $x + y = c$, $y = mx + c$ by completing tables of values Know/use the term origin Starting with ratio, find the gradient of a simple linear function from its graph	Work with coordinates in all four quadrants Recognise, sketch and produce graphs of linear functions of one variable with appropriate scaling, using equations in x and y and the Cartesian plane Model situations or procedures using graphs Interpret mathematical relationships both algebraically and graphically		Work with x and y coordinates in all four quadrants Understand the relationship between gradient and ratio Construct and interpret graphs in real-world contexts e.g. distance-time, money conversion, temperature conversion Recognise and sketch the graphs of simple linear functions
	Y9	Recognise a linear graph from a range of equation forms Plot/sketch line graphs of the forms $y=mx+c$ and $ax+by=c$ Understand/interpret the form $y = mx + c$ for linear graphs Use line equations to identify parallel lines, including equations that need rearranging Use a line equation to decide whether a given point would lie on the line Identify the gradient, y -intercept and equation of a straight line from its graph Plot/sketch quadratic graphs of the form $y=x^2+c$; identify values of y for given values of x , and vice versa Plot/interpret graphs of piece-wise linear functions in real contexts Plot/interpret distance-time graphs and speed-time graphs including approximate solutions to kinematic problems	Recognise, sketch and produce graphs of quadratic functions of one variable with appropriate scaling, using equations in x and y and the Cartesian plane Reduce a given linear equation in two variables to the standard form $y = mx + c$ Calculate and interpret gradients and intercepts of graphs of linear equations numerically, graphically and algebraically Use linear graphs to estimate values of y for given values of x and vice versa Find approximate solutions to contextual problems from given graphs of a variety of functions, including piece-wise linear graphs	Use the form $y=mx+c$ to identify parallel lines Plot and interpret graphs in real contexts, to find approximate solutions to problems such as simple kinematic problems involving distance, speed and acceleration Recognise, sketch and interpret graphs of linear functions, quadratic functions, simple cubic functions, and the reciprocal function $y=1/x$	Use a table of values to plot graphs of linear and quadratic functions given as y in terms of x Find the gradient and intercept of straight lines, graphically and using $y=mx+c$ Construct and interpret graphs in real-world contexts e.g. distance-time, money conversion, temperature conversion <u>Use a table of values to plot implicit linear functions e.g. $2x + 3y = 12$</u> <u>Use the form $y=mx+c$ to find and sketch equations of straight lines</u> Recognise and sketch the graphs of simple linear and quadratic functions e.g. $x=1$, $y=2x$, $y=x^2$ <u>Interpret straight line gradients as rates of change e.g. gradient of a distance-time graph as a velocity</u> Recognise and sketch the graphs of simple linear and quadratic functions

	<p>Y10</p> <p>REVISE using the form $y = mx + c$ for linear graphs</p> <p>REVISE using line equations to identify parallel lines, including equations that need rearranging</p> <p>REVISE using a line equation to decide whether a given point would lie on the line</p> <p>REVISE identifying the gradient, y-intercept and equation of a straight line from its graph</p> <p>Interpret the gradient and y-intercept of a line graph in a simple context</p> <p>Use a graph to find the approximate solution of a linear equation</p> <p>Find the gradient of the line joining two given points</p> <p>Find the equation of a line through one point with a given gradient, through one point and parallel to another line, or through two given points</p> <p>Interpret the gradient of a straight line graph as a rate of change in context</p> <p>Interpret the y-intercept of a straight line graph in context</p> <p>Plot graphs of more complex quadratic functions e.g. $y = x^2 - 5x + 2$</p> <p>REVISE sketching quadratic functions of the form $y = x^2 + c$</p> <p>Recognise that the gradient of a curve is not constant</p> <p>Estimate the gradient of a quadratic or other curve at a particular point, using a tangent</p> <p>Find approximate solutions to simultaneous equations using a graph</p> <p>Plot/sketch/recognise/interpret graphs of simple cubic functions, $y = 1/x$ and other simple reciprocal functions; identify values of y for given values of x, and vice versa</p> <p>Plot simple exponential functions such as $y = 2^x$</p> <p>Plot and interpret graphs of non-standard functions in real contexts</p> <p>Recognise that the point of intersection of two graphs corresponds to the solution of a connected equation</p>	<p>Use linear graphs to find approximate solutions of simultaneous linear equations</p> <p>Use quadratic graphs to estimate values of y for given values of x and vice versa</p> <p>Find approximate solutions to contextual problems from given graphs of a variety of functions, including exponential and reciprocal graphs</p>	<p>Find the equation of the line through two given points, or through one point with a given gradient</p> <p>Find approximate solutions to two linear simultaneous equations using a graph</p> <p>Interpret the gradient of a straight line graph as a rate of change</p> <p>Plot and interpret graphs, including reciprocal graphs and graphs to non-standard functions in real contexts, to find approximate solutions to problems such as simple kinematic problems involving distance, speed and acceleration</p>	<p>Find the equation of a line through two given points, or through one point with a given gradient</p> <p>Identify and find equations of parallel lines</p> <p>Use a table of values to plot cubic graphs, and reciprocals</p> <p>Use graphs to find the approximate solution of two linear simultaneous equations</p> <p>Use a graph to find the approximate solution of a linear equation</p> <p>Interpret the gradient and intercept of straight lines, graphically and using $y = mx + c$</p> <p>Recognise and sketch graphs of $y = x^3$ and $y = 1/x$</p> <p>[Note: finding the midpoint or length of the line segment joining two pairs of co-ordinates is not explicitly included, although a scaffolded question could lead to these results]</p>
	<p>Y11</p> <p>Identify/interpret roots, intercepts and turning points of quadratic functions graphically</p> <p>Estimate solutions to quadratic equations of the forms $ax^2 + bx + c = 0$ and $ax^2 + bx + c = d$ using graphs</p> <p>REVISE plotting graphs of quadratic functions, simple cubic functions, $y = 1/x$ and other simple reciprocal functions</p>		<p>Find approximate solutions to a quadratic equation using a graph</p> <p>Identify and interpret roots, intercepts and turning points of quadratic functions graphically</p>	<p>Use graphs to find approximate roots of quadratic equations</p> <p>Identify intercepts and, using symmetry, the turning point of graphs of quadratic functions</p>

		SCHEME OF WORK	NATIONAL CURRICULUM KS3	NATIONAL CURRICULUM KS4	OCR GCSE SPECIFICATION
FORMULAE & SUBSTITUTION	NC Y5				
	NC Y6	Use simple formulae			
	Y7	Substitute positive integers and decimals into one-step and two-step expressions e.g. $n/3$, $2(x+4)$ Substitute negative integers into expressions, including squaring Test the equivalence of expressions by substitution	Substitute numerical values into expressions		Substitute positive numbers into simple expressions
	Y8	REVISE earlier skills by practising in context – opportunities highlighted within scheme of work			
	Y9	Substitute positive and negative numbers into formulae, including scientific formulae Substitute into the kinematics formulae $v=u+at$, $s=ut+\frac{1}{2}at^2$, $v^2=u^2+2as$ Change the subject of a 1-step formula, understanding the meaning of 'subject' and 'in terms of'	Substitute numerical values into formulae, including scientific formulae Rearrange formulae to change the subject		Substitute positive numbers into simple formulae to find the value of the subject Use the kinematics formulae $v=u+at$, $s=ut+\frac{1}{2}at^2$, $v^2=u^2+2as$ <u>Substitute positive or negative numbers into more complex formulae, including powers, roots and algebraic fractions</u>
	Y10	Distinguish situations that can be modelled by an expression or a formula; create a formula to describe a situation Change the subject of a formula involving 2 or more steps, including reciprocals	Model situations or procedures by translating them into algebraic formulae		Rearrange formulae to change the subject, where the subject appears once only <u>Formulate simple formulae and expressions from real-world contexts</u> <u>Rearrange formulae to change the subject, including cases where a reciprocal of the subject appears</u>
	Y11	Change the subject of formulae involving powers and roots Change the subject of a formula where the subject appears twice			<u>Rearrange formulae to change the subject in cases where a power of the subject appears or where the subject appears twice</u>

		SCHEME OF WORK	NATIONAL CURRICULUM KS3	NATIONAL CURRICULUM KS4	OCR GCSE SPECIFICATION
SOLVING EQUATIONS	NC Y5				
	NC Y6	Express missing number problems algebraically Find pairs of numbers that satisfy an equation with two unknowns			
	Y7	Find fact families for algebraic bar models e.g. $x + 7 = 10$ Solve 1-step and 2-step equations involving integers and decimals where the unknown term is positive, using calculators where appropriate e.g. $2a + 4.7 = 9.3$ Solve simple 'think of a number' style questions by forming and solving an equation Solve equations involving number fractions e.g. $2k - \frac{5}{8} = 5$	Recognise and use relationships between operations including inverse operations Use algebraic methods to solve linear equations in one variable Interpret mathematical relationships both algebraically and graphically		
	Y8	Solve equations involving brackets Form solve an equation involving brackets in simple contexts Solve simple equations involving indices e.g. $3^x \times 3^x = 3^{10}$ Set up and solve equations involving angles			
	Y9	Solve a linear equation where the unknown term is negative e.g. $53 - 2x = 37$ Solve a linear equation with the unknown on both sides when the solution is an integer, fraction or negative or when the equation involves brackets Form and solve linear equations of the types listed above to solve problems e.g. perimeter, area, angles Recognise that the point of intersection of two graphs corresponds to the solution of a connected equation	Use algebraic methods to solve linear equations in one variable (including all forms that require rearrangement)		Solve linear equations in one unknown algebraically Set up and solve linear equations in mathematical and non-mathematical contexts, including those with the unknown on both sides of the equation Interpret solutions to equations in context
	Y10	REVISE solving linear equations with the unknown on both sides, including with brackets, and where the unknown term is negative Solve quadratic equations of the form $x^2 + bx + c = 0$ by factorising Form and solve linear equations of all types to solve increasingly complex problems Find the solution to a complex equation, to a required degree of accuracy, using 'trial and improvement' Find approximate solutions to simultaneous equations using a graph Solve two linear simultaneous equations algebraically Solve a problem by deriving two simultaneous equations, and interpret the solution		Solve two linear simultaneous equations	Set up and solve two linear simultaneous equations in two variables algebraically
	Y11	Solve a quadratic equation of the form $x^2 + bx + c = 0$ by factorising Estimate solutions to quadratic equations of the forms $ax^2 + bx + c = 0$ and $ax^2 + bx + c = d$ using graphs Deduce roots of quadratic functions algebraically Solve context problems by solving a quadratic equation		Deduce roots of quadratic functions algebraically Solve quadratic equations given in the form $x^2+bx+c=0$ by factorising	Find the roots of a quadratic equation algebraically Solve quadratic equations of the form x^2+bx+c by factorising

		SCHEME OF WORK	NATIONAL CURRICULUM KS3	NATIONAL CURRICULUM KS4	OCR GCSE SPECIFICATION
INEQUALITIES	NC Y5				
	NC Y6				
	Y7		Use the symbols =, ≠, <, >, ≤, ≥ in numerical contexts		Understand and use the symbols <, ≤, > and ≥
	Y8	Use inequalities for groups in a frequency table, understanding e.g. $10 < x < 20$ and $10 \leq x \leq 20$ Solve a 1-step/2-step linear inequality with positive x term Set up and solve a 1-step/2-step linear inequality with positive x term			
	Y9	Solve a 1-step/2-step linear inequality with positive x term and brackets, including with non-integer solutions Find the set of integers that are solutions to an inequality, including using set notation Represent an inequality on a number line Solve a simple three-part inequality with positive x term e.g. $10 < 3x + 9 < 40$		Solve linear inequalities in one variable, representing the solution set on a number line	Solve linear inequalities in one variable, expressing solutions on a number line using the conventional notation
	Y10	Understand the situations in which an inequality is reversed REVISE solving a 1-step/2-step linear inequality with positive x term and brackets, including with non-integer solutions REVISE solving a simple three-part inequality with positive x term Solve linear inequalities with unknowns on both sides and with negative terms of the unknown e.g. $20 - 3x < 8$ Solve problems by constructing and solving linear inequalities in one variable			
	Y11				

		SCHEME OF WORK	NATIONAL CURRICULUM KS3	NATIONAL CURRICULUM KS4	OCR GCSE SPECIFICATION
SEQUENCES	NC Y5				
	NC Y6	Generate/describe linear number sequences			
	Y7	Describe and continue sequences of patterns Predict and check next terms of patterns Work with sequences represented in a position-term table or graph Differentiate between linear and non-linear sequences, numerical and patterns Identify a linear (arithmetic), geometric, or Fibonacci-type sequence Continue linear and non-linear sequences Explain the term-to-term rule of a sequence Generate a sequence from a position-to-term rule e.g. $n^2 - 4$ Investigate the sequences of square and triangular numbers	Generate terms of a sequence from either a term-to-term or a position-to-term rule Recognise arithmetic sequences Recognise geometric sequences and appreciate other sequences that arise	Recognise and use the sequences of triangular and square numbers, and simple arithmetic progressions	Generate a sequence by spotting a pattern or using a term-to-term rule given algebraically or in words Recognise sequences of triangular and square numbers, and simple arithmetic progressions
	Y8	Explore different representations of a sequence: patterns, graph, table, equation, co-ordinates, function machine Generate a sequence from a written description of the first term and term-to-term rule Generate a sequence from a position-to-term rule, including more complex rules e.g. $(n + 1)^2$ Further investigate Fibonacci-type sequences			Generate a sequence from a formula for the nth term
	Y9	REVISE generating terms of a sequence from a position-to-term rule Find the nth term of an ascending/descending linear sequence Use the nth term of a sequence to decide whether a given number is in a sequence and to find a later term Justify a position to term rule in relation to a sequence of patterns e.g. why is the rule ' $\times 2 + 1$ '? Recognise the sequence of cube numbers	Find the nth term of an arithmetic sequence	Deduce expressions to calculate the nth term of linear sequences Recognise and use the sequence of cube numbers	Find a position-to-term rule for simple arithmetic sequences, algebraically or in words e.g. $2n, n + 5$ Find a formula for the nth term of an arithmetic sequence, ascending or descending Recognise the sequence of cube numbers
	Y10	Use a Fibonacci-type sequence with algebraic terms e.g. a, b, ... Solve problems involving Fibonacci-type sequences, including finding next terms and missing terms within the sequence Generate terms of a quadratic sequence from a more complex position to term rule e.g. $3n^2 - 2n$ Find the <u>next terms</u> of a quadratic sequence using first and second differences (not finding nth term yet) REVISE recognising/describing a simple geometric sequence and find next terms, or any term		Recognise and use Fibonacci type sequences, quadratic sequences, and simple geometric progressions (r^n where n is an integer and r is positive and rational)	Recognise Fibonacci and quadratic sequences, and simple geometric progressions (r^n where n is an integer and r is a positive rational number)
	Y11				

	SCHEME OF WORK	NATIONAL CURRICULUM KS3	NATIONAL CURRICULUM KS4	OCR GCSE SPECIFICATION
2D SHAPE & SYMMETRY	NC Y5	Distinguish between regular and irregular polygons using equal sides and angles		
	NC Y6	Draw shapes using given lengths & angles Classify shapes based on their properties and sizes Illustrate and name the parts of a circle, including radius, diameter, circumference Know that the diameter is twice the radius		
	Y7	Use capital letter notation for shapes, lines & angles Identify parallel and perpendicular lines, including within geometric figures Classify triangles: equilateral, isosceles, scalene, right-angled Classify quadrilaterals (square, rectangle, parallelogram, rhombus, kite, trapezium) using equal, parallel and perpendicular sides Identify polygons with up to 10 sides Distinguish regular and irregular polygons	Describe, sketch and draw using conventional terms and notations: points, lines, parallel lines, perpendicular lines, right angles, regular polygons, and other polygons that are reflectively and rotationally symmetric Use the standard conventions for labelling the sides and angles of triangle ABC	Use the terms points, lines, line segments, vertices, parallel lines, perpendicular lines Use the standard conventions for labelling and referring to the sides and angles of triangles Know the terms: regular polygon, scalene, isosceles and equilateral triangle, quadrilateral, square, rectangle, kite, rhombus, parallelogram, trapezium, pentagon, hexagon, octagon Draw diagrams from written descriptions as required by questions Know the basic properties of isosceles, equilateral and right-angled triangles; give geometrical reasons to justify these properties
	Y8	REVISE using capital letter notation for shapes, lines & angles Identify the side and angle properties of quadrilaterals (including parallel sides) Know what is meant by an isosceles trapezium Identify lines of symmetry in 2D shapes Identify these parts of a circle: centre, radius, diameter, circumference	Derive and illustrate properties of triangles, quadrilaterals, circles, and other plane figures (e.g. equal lengths and angles) using appropriate language and technologies	Identify and apply circle definitions and properties, including: centre, radius, chord, diameter, circumference Understand and use the terms centre, radius, chord, diameter and circumference Know and apply the formula $C=2\pi r=\pi d$ to calculate the circumference of a circle Know the basic properties of the square, rectangle, parallelogram, trapezium, kite and rhombus; give geometrical reasons to justify these properties Identify reflection symmetries of triangles, quadrilaterals and other polygons
	Y9	Identify these parts of a circle: chord, tangent, arc, sector, segment Identify the order of rotational symmetry of a shape		Identify and apply circle definitions and properties, including: chord, tangent, arc, sector, segment Identify rotation symmetries of triangles, quadrilaterals and other polygons <u>Understand and use the terms tangent, arc, sector and segment</u>
	Y10	Know/use Pythagoras' theorem to calculate any side or an angle in a right-angled triangle Know the meaning of a Pythagorean triple Use Pythagoras' theorem to determine whether a given triangle is right-angled Solve a range of 2D problems using Pythagoras' theorem	Use Pythagoras' Theorem to solve problems involving right-angled triangles Apply angle facts, triangle congruence, similarity and properties of quadrilaterals to derive results about angles and sides, including Pythagoras' Theorem, and use known results to obtain simple proofs Interpret mathematical relationships both algebraically and geometrically	Apply Pythagoras' Theorem in right-angled triangles in 2D <u>Recall and use Pythagoras' theorem</u> <u>Know, derive and apply Pythagoras' theorem to find lengths in right-angled triangles in 2D figures</u>
	Y11			

		SCHEME OF WORK	NATIONAL CURRICULUM KS3	NATIONAL CURRICULUM KS4	OCR GCSE SPECIFICATION
CONGRUENCE & SIMILARITY	NC Y5				
	NC Y6	Solve problems involving similar shapes where the scale factor is known or can be found			
	Y7				
	Y8	Know/use the fact that corresponding lengths in similar shapes are in the same ratio		Compare lengths using ratio notation and/or scale factors; make links to similarity Apply the concepts of congruence and similarity, including the relationship between lengths in similar figures Make links between similarity and scale factors or ratios	Identify similar triangles Compare lengths using ratio notation and scale factors
	Y9	Compare lengths, areas and volumes using ratio notation		Compare areas and volumes using ratio notation and/or scale factors; make links to similarity	Compare areas and volumes using ratio notation and scale factors
	Y10	Solve geometrical problems involving using similarity to calculate missing lengths Finding missing lengths in similar shapes when the scale factor is given as a ratio Prove that two triangles are similar using angles Know and use the conditions for triangles to be congruent (SSS, SAS, RHS, ASA) Prove that two given triangles are congruent Move freely between scale factors for length, area and volume; solve practical problems involving length, area and volume in similar figures	Identify congruent triangles Know and use the criteria for congruence of triangles		Identify congruent triangles Apply similarity to calculate unknown lengths in similar figures Prove that two triangles are congruent using the cases SSS, ASA, SAS, RHS Prove that two triangles are similar
	Y11	Solve practical problems involving lengths in similar figures			

		SCHEME OF WORK	NATIONAL CURRICULUM KS3	NATIONAL CURRICULUM KS4	OCR GCSE SPECIFICATION
ROTATIONS, REFLECTIONS, TRANSLATIONS & VECTORS	NC Y5	Identify/describe the position of a shape following a reflection or translation; know that the shape has not changed			
	NC Y6	Draw and translate simple shapes on the co-ordinate plane using word descriptions of movement Reflect shapes in the co-ordinate axes			
	Y7				
	Y8	Reflect in a vertical, horizontal or diagonal mirror line Reflect a shape in a mirror line specified by its equation e.g. $x = 3$, y -axis, $y = -x$	Construct congruent triangles, with and without coordinate grids		Use x - and y -coordinates in plane geometry problems, including transformations of simple shapes Reflect a simple shape in a given mirror line
	Y9	Rotate a shape through 90° or 180° on co-ordinate axes Translate a shape using a vector			Perform a specified translation using a column vector
	Y10				
	Y11	Fully describe a single transformation given two congruent 2D shapes Understand the concept of a vector Know and use different notations for vectors, including diagrammatic representation Add and subtract vectors Multiply a vector by a scalar Solve simple geometrical problems involving vectors e.g. third side of a triangle with side p & q	Identify properties of, and describe the results of, translations, rotations and reflections applied to given figures	Describe translations as 2D vectors Apply addition and subtraction of vectors, multiplication of vectors by a scalar, and diagrammatic and column representations of vectors	Identify the mirror line of a reflection from a shape and its image Use a column vector to describe a translation <u>Identify a mirror line $x=a$, $y=b$, $y=x$ or $y=-x$ from a simple shape and its image under reflection</u> <u>Identify the centre, angle and direction of a rotation from a simple shape and its image under rotation</u> <u>Understand addition, subtraction and scalar multiplication of vectors</u> <u>Represent a 2-dimensional vector as a column vector, and draw column vectors on a square or coordinate grid</u>

		SCHEME OF WORK	NATIONAL CURRICULUM KS3	NATIONAL CURRICULUM KS4	OCR GCSE SPECIFICATION
PERIMETER, AREA & VOLUME	NC Y5	Measure/calculate the perimeter of rectilinear shapes in cm and m. Calculate the area of rectangles and rectilinear shapes, including using cm^2 and m^2 Estimate the area of irregular shapes using a grid Estimate volume and capacity			
	NC Y6	Recognise that shapes with the same area can have different perimeters & vice versa Calculate the area of parallelograms & triangles Calculate / estimate / compare the volume of cubes and cuboids using cm^3 , m^3 and other units			
	Y7	Work out the perimeter of a simple shape; find a missing side given the perimeter Work out the perimeter of a rectilinear shape Calculate the area of a rectangle or parallelogram, understanding how the formulae for these are related Find a simple expression for the area of a rectangle or parallelogram e.g. $\text{Area} = ab$ Calculate the area of a triangle, understanding the formula	Calculate and solve problems involving: perimeters of 2-D shapes		Know and apply the formulae $A=1/2bh$ for the area of a triangle and $A=bh$ for the area of a rectangle Calculate the perimeter of rectilinear shapes
	Y8	Calculate the circumference of a circle, given the radius or diameter, including in terms of π Write an expression for the area or perimeter of a rectangle, parallelogram, triangle or circle where the lengths are given algebraically REVISE calculating the area of a rectangle, parallelogram or triangle Use the area of a rectangle, parallelogram or triangle to calculate a length or perpendicular height Calculate the area of a trapezium Calculate the area of compound shapes made from rectangles, parallelograms, triangles and/or trapezia Calculate the area of a circle, given the radius or diameter, including in terms of π Calculate the area of compound shapes involving circles and semicircles	Derive and apply formulae to calculate and solve problems involving the perimeter and area of triangles, parallelograms, and trapezia Calculate and solve problems involving: perimeters of 2-D shapes (including circles), areas of circles and composite shapes	Calculate exactly with multiples of π	Recall and use formulae for the circumference and area of a circle Apply perimeter formulae in calculations involving the perimeter of composite 2D shapes Calculate the area of a trapezium Know and apply the formula $A=\pi r^2$ to calculate the area of a circle Apply area formulae in calculations involving the area of composite 2D shapes
	Y9	Calculate the perimeter of composite shapes that include sections of a circle, including in terms of π Calculate the area of more complex composite shapes that include sections of a circle, including in terms of π [cf. Y8] Calculate the volume of cuboids and right prisms Know/use the link between volume and capacity Calculate the surface area of cuboids and right prisms	Derive and apply formulae to calculate and solve problems involving the volume of cuboids (including cubes) Use the properties of faces, surfaces, edges and vertices of cubes, cuboids, and prisms to solve problems in 3D		
	Y10	REVISE solving problems involving the area and circumference of circles, including in terms of π Solve problems involving the arc length or perimeter of a sector, including in terms of π Solve problems involving the area of a sector, including in terms of π Calculate the angle/radius of a sector using the arc length or area Calculate the volume of a cylinder, including in terms of π Calculate the surface area of a cylinder, including in terms of π Solve practical problems involving the volume and surface area of solids	Derive and apply formulae to calculate and solve problems involving the volume of prisms (including cylinders) Use the properties of faces, surfaces, edges and vertices of cylinders to solve problems in 3D	Calculate arc lengths, angles and areas of sectors of circles	Use multiples of π in exact calculations without a calculator Calculate the area of a sector of a circle given its angle and radius Calculate the arc length of a sector of a circle given its angle and radius
	Y11	Find the volume of spheres, cones, frustums and pyramids, including in terms of π Find the surface area of spheres, cones, frustums and pyramids, including in terms of π Find the volume or surface area of a composite solid, including in terms π and in the context of density Continue to solve practical problems involving the volume and surface area of solids	Use the properties of faces, surfaces, edges and vertices of pyramids, cones and spheres to solve problems in 3D Derive and apply formulae to calculate and solve problems involving the volume of cuboids (including cubes) and other prisms (including cylinders)	Calculate surface areas and volumes of spheres, pyramids, cones and composite solids	Calculate the surface area and volume of spheres, cones and simple composite solids (formulae will be given) Calculate the surface area and volume of a pyramid (the formula will be given)

		SCHEME OF WORK	NATIONAL CURRICULUM KS3	NATIONAL CURRICULUM KS4	OCR GCSE SPECIFICATION
ANGLES	NC Y5	Estimate/compare acute/obtuse/reflex angles Draw/measure angles in degrees Identify angles at a point and on a straight line Use the properties of rectangles to find missing lengths and angles			
	NC Y6	Find unknown angles in any triangles or quadrilaterals Find missing angles at a point, on a straight line, or where they are vertically opposite			
	Y7	Understand angles as a measure of turn Classify acute, obtuse, reflex and right angles Recognise interior and exterior angles of a polygon Measure/draw acute, obtuse and reflex angles Know/use the sum of angles at a point, on a line, in a triangle (including isosceles) and in a quadrilateral Recognise/use vertically opposite angles Apply combinations of angle rules to problems	Draw and measure angles in geometric figures Apply the properties of angles at a point, angles at a point on a straight line, vertically opposite angles Understand and use the relationship between parallel lines and alternate and corresponding angles		Know the terms acute, obtuse, right and reflex angles Use a protractor to construct and measure angles Know and use the sum of the angles at a point is 360° Know that the sum of the angles at a point on a line is 180° Know and use vertically opposite angles are equal Know and use alternate angles or corresponding angles on parallel lines are equal
	Y8	REVISE classifying acute, obtuse, reflex and right angles REVISE solving problems using the sum of angles at a point, on a line, in a triangle (including isosceles), in a quadrilateral and using vertically opposite angles Identify and use alternate, corresponding and co-interior angles near parallel lines; use the term transversal Use the sum of the interior and exterior angles of polygons Know the definition of a regular polygon Find the interior and exterior angles in a regular polygon	Draw and measure angles in geometric figures, including interpreting scale drawings Derive and use the sum of angles in a triangle and use it to deduce the angle sum in any polygon, and to derive properties of regular polygons		Derive and use the sum of the interior angles of a triangle is 180° Derive and use the sum of the exterior angles of a polygon is 360° Find the sum of the interior angles of a polygon Find the interior angle of a regular polygon
	Y9	Understand and use bearings Construct scale diagrams involving bearings Solve geometrical problems using bearings REVISE identifying and using alternate angles, corresponding angles and co-interior angles near parallel lines Solve increasingly complex angle problems using a mixture of rules, including base angles in an isosceles triangle REVISE solving problems involving interior and exterior angles in polygons		Interpret and use bearings	
	Y10	Apply angle facts to derive results about angles and sides Create a geometrical proof Know/use the trigonometric ratios $\sin \theta$, $\cos \theta$, $\tan \theta$	Use trigonometric ratios in similar triangles to solve problems involving right-angled triangles	Link trigonometric ratios to similar triangles Apply trigonometric ratios to find angles and lengths in right-angled triangles in 2D	Recall and use the trigonometric identities for right-angled triangles Apply angle facts to find angles in rectilinear figures, and to justify results in simple proofs. e.g. "The sum of the interior angles of a triangle is 180°" Use the basic properties of isosceles, equilateral and right-angled triangles to find lengths and angles in rectilinear figures and in simple proofs Use the properties of special triangles and quadrilaterals to find lengths and angles in rectilinear figures and in simple proofs Know and apply the trigonometric ratios, $\sin \theta$, $\cos \theta$ and $\tan \theta$ and apply them to find angles and lengths in right-angled triangles in 2D figures Apply congruent triangles in calculations and simple proofs. e.g. The base angles of an isosceles triangle are equal
	Y11	Know exact values of $\sin \theta$, $\cos \theta$ for $\theta = 0^\circ, 30^\circ, 45^\circ, 60^\circ, 90^\circ$ Know exact values of $\tan \theta$ for $\theta = 0^\circ, 30^\circ, 45^\circ, 60^\circ$ Use basic trigonometry to solve problems involving bearings and angles of depression/elevation		Know the exact values of $\sin \theta$ and $\cos \theta$ for $\theta = 0, 30, 45, 60, 90^\circ$; know the exact value of $\tan \theta$ for $\theta = 0, 30, 45, 60^\circ$	Know the exact values of $\sin \theta$ and $\cos \theta$ for $\theta = 0^\circ, 30^\circ, 45^\circ, 60^\circ$ and 90°; know the exact value of $\tan \theta$ for $\theta = 0^\circ, 30^\circ, 45^\circ$ and 60°

		SCHEME OF WORK	NATIONAL CURRICULUM KS3	NATIONAL CURRICULUM KS4	OCR GCSE SPECIFICATION
3D SOLIDS	NC Y5	Identify 3D shapes from 2D representations, including cubes and cuboids			
	NC Y6	Recognise/describe/build simple 3D solids Make nets of simple 3D solids			
	Y7				
	Y8				
	Y9	Construct/interpret plans and elevations Recognise/know the properties of the cube, cuboid, prism, cylinder, pyramid, cone and sphere		Construct and interpret plans and elevations of 3D shapes	Use the terms vertices, edges, planes Recognise the terms face, surface, edge, and vertex Recognise and know the properties of the cube, cuboid, prism, cylinder, pyramid, cone and sphere Interpret plans and elevations of simple 3D solids Construct plans and elevations of simple 3D solids, and representations (e.g. using isometric paper) of solids from plans and elevations
	Y10	Construct a shape (or draw on isometric paper) from its plans & elevations Draw the plans and elevations of a given solid			
	Y11				

		SCHEME OF WORK	NATIONAL CURRICULUM KS3	NATIONAL CURRICULUM KS4	OCR GCSE SPECIFICATION
UNITS & TIME	NC Y5	<p>Convert between metric units including distance, mass & capacity</p> <p>Understand/use approximate equivalences between metric and imperial units</p> <p>Solve problems involving measure using all four operations and decimal notation, including scaling</p> <p>Solve problems involving converting between units of time</p> <p>Interpret information from timetables</p>			
	NC Y6	<p>Solve problems involving calculating/converting units of measure, using decimals up to 3 dp</p> <p>Use/read/write/convert between standard units of length, mass, and time</p> <p>Use/read/write standard units of volume</p> <p>Convert between standard units of capacity</p> <p>Convert between miles and kilometres</p> <p>Use/read/write/convert between standard units of time</p>			
	Y7	<p>Use a table to find the distance between two places</p> <p>Convert between metric units of length, mass and capacity</p> <p>Understand the prefixes used for metric units e.g. milli</p>	<p>Use standard units of mass, length and money and other measures, including with decimal quantities</p> <p>Change freely between related standard units e.g. length, mass</p>		<p>Solve simple problems involving quantities in direct proportion, including currency conversion problems</p> <p>Use standard units of measurement for length, area, capacity, mass and money</p>
	Y8	<p>Convert between currencies using calculations, flow charts and graphs</p> <p>Convert between metric units of length, mass and capacity in more complex contexts e.g. to find area in m²</p> <p>Solve problems involving time and the calendar</p>	<p>Use standard units of time</p> <p>Change freely between related standard units e.g. time, length, capacity</p>		<p>Use and convert standard units of measurement for time</p> <p>Convert standard units of measurement for time and capacity</p>
	Y9	<p>Solve problems involving unit pricing</p> <p>Solve simple problems involving speed, including finding an average speed</p> <p>Convert between metric units of area and volume</p>	<p>Use compound units such as speed and unit pricing to solve problems</p> <p>Change freely between related standard units e.g. area, volume</p>		<p>Use and convert simple compound units (e.g. for speed, rates of pay, unit pricing)</p> <p>Know and apply in simple cases: $\text{speed} = \text{dist} \div \text{time}$</p>
	Y10	<p>Solve more complex problems involving speed e.g. the average speed for a journey in two parts</p> <p>Convert between units of speed</p> <p>Solve simple problems involving density, including where the mass needs changing first to obtain specific units in the answer</p> <p>Solve simple problems involving pressure</p> <p>Solve problems involving rates of pay, population density and unit pricing</p> <p>Solve problems involving other rates of change</p> <p>Analyse the effect of changes in values e.g. "It actually weighed less than estimated. What effect would this have on the density you calculated?"</p>	<p>Use compound units such as speed and density to solve problems</p>	<p>Convert between related compound units (speed, rates of pay, prices, density, pressure) in numerical contexts</p> <p>Convert between related compound units in numerical algebraic contexts</p>	<p>Convert standard units of measurement for area and volume</p> <p>Use and convert compound units in algebraic contexts</p> <p>Use and convert standard units in algebraic contexts</p> <p>Know and apply: $\text{density} = \text{mass} \div \text{volume}$</p> <p>Use and convert other compound units (e.g. density, pressure)</p>
	Y11	<p>Use the volume of a composite solid in the context of density [see 'Perimeter, Area & Volume']</p>			

		SCHEME OF WORK	NATIONAL CURRICULUM KS3	NATIONAL CURRICULUM KS4	OCR GCSE SPECIFICATION
CONSTRUCTION & LOCI	NC Y5				
	NC Y6				
	Y7	<p>Draw and measure line segments</p> <p>Measure objects using appropriate units</p> <p>Construct triangles using SAS, ASA, SSS, including from written descriptions</p> <p>Construct more complex shapes/pictures involving multiple polygons</p>	<p>Draw and measure line segments in geometric figures</p>		<p>Use a ruler to construct and measure straight lines</p> <p>Use a protractor to construct and measure angles</p>
	Y8	<p>REVISE constructing triangles using SAS, ASA, SSS, including from written descriptions</p> <p>REVISE constructing more complex shapes/pictures involving multiple polygons</p> <p>Measure/draw acute, obtuse and reflex angles</p>			<p>Use compasses to construct circles</p>
	Y9	<p>Construct an angle bisector</p> <p>Construct the perpendicular bisector of a line segment</p>	<p>Derive and use the standard ruler and compass constructions (perpendicular bisector of a line segment, bisecting a given angle)</p>		<p>Construct the perpendicular bisector and midpoint of a line segment</p> <p>Construct the bisector of an angle formed from two lines</p>
	Y10	<p>Construct the perpendicular from a point to a line, and the perpendicular at a point on a line</p> <p>Use construction to identify the shortest distance from a point to a line</p> <p>Construct the loci of points a fixed distance from a point, a fixed distance from a line, equidistant from two points, and equidistant from two lines</p> <p>Construct a triangle from SSS</p> <p>Construct an angle of 60° and an angle of 30°</p> <p>Choose techniques to construct 2D shapes e.g. a rhombus</p>	<p>Derive and use the standard ruler and compass constructions (constructing a perpendicular to a given line from/at a given point)</p> <p>Recognise and use the perpendicular distance from a point to a line as the shortest distance to the line</p>		<p>Construct the perpendicular from a point to a line</p> <p>Construct the perpendicular to a line at a point</p> <p>Know that the perpendicular distance from a point to a line is the shortest distance to the line</p> <p>Understand the term 'equidistant'</p>
	Y11	<p>Combine techniques to solve more complex loci problems, including shading regions satisfied by multiple 'rules'</p>			<p>Apply ruler and compass constructions to construct figures and identify the loci of points, to include real-world problems</p>

		SCHEME OF WORK	NATIONAL CURRICULUM KS3	NATIONAL CURRICULUM KS4	OCR GCSE SPECIFICATION
COLLECTING DATA	NC Y5				
	NC Y6				
	Y7				
	Y8	TBC: Understand and use primary and secondary sources of data TBC: Collect data, including using questionnaires			
	Y9				
	Y10				
	Y11	Understand the limitations of sampling Know what is meant by a simple random sample		Infer properties of populations or distributions from a sample, whilst knowing the limitations of sampling	Define the population in a study, and understand the difference between population and sample Understand what is meant by simple random sampling, and bias in sampling

		SCHEME OF WORK	NATIONAL CURRICULUM KS3	NATIONAL CURRICULUM KS4	OCR GCSE SPECIFICATION
USING STATISTICS	NC Y5				
	NC Y6	Calculate the mean of a simple set of discrete data and interpret it as an average			
	Y7	Find the range of a list of integers, including obtained by substitution or the result of calculations Find the median of a list of integers, understanding this as an average Calculate the mean for simple values or measurements, understanding this as an average Identify a missing value, given the mean, median or range			Calculate the mean, median and range for ungrouped data
	Y8	Identify qualitative, quantitative, discrete, continuous data Complete/interpret ungrouped frequency tables Calculate the total from an ungrouped frequency table Interpret a grouped frequency table Populate a grouped frequency table from a list of values or written 'facts' Use inequalities for groups in a frequency table TBC: Revisit the median and mean, including finding the total given the mean TBC: Find the mean from grouped data TBC: Work out the mode and modal class TBC: Choose the appropriate average TBC: Comparing distributions using measures			Identify the mode for ungrouped data
	Y9	REVISE finding the modal class of set of grouped data REVISE estimating the mean of grouped data Estimate the range from a grouped frequency table Find the class containing the median of a set of data Choose appropriate statistics to describe a set of data Increasingly interpret statistics in context	Describe, interpret and compare observed distributions of a single variable through appropriate measures of central tendency (mean, mode, median) and spread (range, consideration of outliers)	Interpret, analyse and compare the distributions of data sets from univariate empirical distributions through appropriate measures of central tendency (including modal class) and spread (the range) Apply statistics to describe a population	Find the modal class, and calculate estimates of the range, mean and median for grouped data, and understand why they are estimates Make simple comparisons Compare data sets using 'like for like' summary values
	Y10	Analyse and compare sets of data, appreciating the limitations of different statistics: mean, median, mode, range, including statistics estimated from grouped data			Understand the advantages and disadvantages of summary values
	Y11	Use a sample to infer properties of a population		Infer properties of populations or distributions from a sample, whilst knowing the limitations of sampling	Describe a population using statistics Infer properties of populations or distributions from a sample

		SCHEME OF WORK	NATIONAL CURRICULUM KS3	NATIONAL CURRICULUM KS4	OCR GCSE SPECIFICATION
TABLES, CHARTS & DIAGRAMS	NC Y5	Solve comparison, sum and difference problems using information presented in a line graph Interpret information in tables, including timetables			
	NC Y6	Construct/interpret simple pie charts and line graphs and use these to solve problems Construct/interpret pictograms for categorical data or discrete numerical data Construct bar charts for categorical data or discrete numerical data: [Bar charts and pictograms created as early as Year 3]			
	Y7	Interpret simple pie charts showing quarters, fifths, tenths given as fractions, decimals or percentages Reading information from a table Complete/interpret a two-way table Complete/interpret a frequency tree Interpret bar charts and vertical line charts Plot a line graph for time series data Interpret pie charts using understanding of proportion, where the chart is divided into equal portions or the angles are given Construct a pie chart by calculating angles; find missing frequencies given the angle and total	Construct and interpret appropriate tables, charts, and diagrams, including frequency tables, bar charts, pie charts, and pictograms for categorical data	Interpret and construct tables and line graphs for time series data	Interpret and construct charts appropriate to the data type; including frequency tables, bar charts, pie charts and pictograms for categorical data, vertical line charts for ungrouped discrete numerical data Interpret and construct line graphs for time series data, and identify trends (e.g. seasonal variations)
	Y8	Draw a scatter graph and describe the relationship and type/strength of correlation shown Recognise data that can be represented using a scatter graph Draw a line of best fit and use it to make predictions, understanding that extrapolating can be unreliable; recognise graphs where a line of best fit would be inappropriate e.g. non-linear relationship Identify an outlier on a scatter graph Represent/interpret data in a two-way table TBC: Interpret and construct statistical diagrams, including multiple bar charts TBC: Construct and interpret pie charts (Assuming this includes measuring angles to interpret) TBC: Compare distributions using charts TBC: Identify misleading graphs	Describe simple mathematical relationships between two variables (bivariate data) in observational and experimental contexts and illustrate using scatter graphs	Use and interpret scatter graphs of bivariate data Recognise correlation and know that it does not indicate causation Draw estimated lines of best fit on a scatter graph and use them to make predictions	Recognise graphical misrepresentation through incorrect scales, labels, etc. Plot and interpret scatter diagrams for bivariate data; recognise correlation Identify an outlier in simple cases e.g. from a list of data Interpret correlation within the context of the variables Draw a line of best fit by eye, and use it to make predictions Interpolate and extrapolate from data, and be aware of the limitations of these techniques Appreciate there may be errors in data from values (outliers) that do not 'fit' Recognise outliers on a scatter graph

	Y9	<p>REVISE constructing pie charts by calculating angles, including with awkward totals</p> <p>Recognise what can and cannot be deduced from a comparison of two pie charts</p> <p>Construct a pie chart using information from a different type of chart/diagram</p> <p>Create a table and use it to group data, by tallying</p> <p>Construct a frequency polygon for grouped data</p> <p>Compare data given in more than one form</p> <p>Construct/interpret bar charts for grouped data</p> <p>Construct/interpret compound bar charts (side-by-side and stacked)</p> <p>Construct/interpret stem and leaf diagrams; identify the mode, median and range from a stem and leaf diagram</p> <p>Use charts to identify probabilities</p>	<p>Describe, interpret and compare observed distributions of a single variable through appropriate graphical representation involving discrete, continuous and grouped data</p> <p>Construct and interpret appropriate tables, charts, and diagrams, including bar charts for grouped numerical data</p>	<p>Interpret, analyse and compare the distributions of data sets from univariate empirical distributions through appropriate graphical representation involving discrete, continuous and grouped data</p>	<p>Interpret multiple and composite bar charts</p> <p>Design tables to classify data</p>
	Y10	<p>REVISE plotting points on a scatter diagram, identifying correlation and interpreting the relationship shown [cf. Y8]</p> <p>REVISE constructing/using a line of best fit [cf. Y8]</p> <p>Understand the lack of reliability of making predictions outside the range of the original data (extrapolating)</p> <p>REVISE outliers, distinguishing these from anomalies [cf. Y8]</p> <p>Understand that correlation does not necessarily indicate causation</p> <p>Continue to use charts to identify probabilities</p> <p>Continue to compare data given in more than one form</p>		<p>Interpolate and extrapolate apparent trends from a scatter graph, whilst knowing the dangers of so doing</p>	<p>Appreciate the distinction between correlation and causation</p>
	Y11				

		SCHEME OF WORK	NATIONAL CURRICULUM KS3	NATIONAL CURRICULUM KS4	OCR GCSE SPECIFICATION
PROBABILITY	NC Y5				
	NC Y6				
	Y7	<p>Use a Venn diagram to sort information (e.g. factors) including using set notation and ξ</p> <p>Group numbers, shapes and other data using set notation</p> <p>Understand the notation ξ for the universal and its impact on the membership of subsets e.g. { even numbers } given $\xi = \{ \text{integers from 1 to 10 inclusive} \}$</p> <p>Understand/use the terms likely, unlikely, even chance (evens), impossible, certain</p> <p>List a sample space, including using set notation</p> <p>Calculate a simple theoretical probability</p> <p>Create a situation to give a required theoretical probability e.g. label the sections on a spinner so that $p(\text{odd}) = 4/5$</p> <p>Understand that the probabilities of all outcomes add to 1; use this to find missing probabilities e.g. in a table</p> <p>Construct/interpret frequency trees</p>	<p>Understand that the probabilities of all possible outcomes sum to 1</p> <p>Enumerate sets and unions/intersections of sets systematically, using tables, grids and Venn diagrams</p>	<p>Apply the property that the probabilities of an exhaustive set of mutually exclusive events sum to one</p>	<p>Use the 0-1 probability scale as a measure of likelihood of random events, e.g. 'impossible' with 0, 'evens' with 0.5, 'certain' with 1</p> <p>Use systematic listing strategies</p> <p>Use a two-circle Venn diagram to enumerate sets, and use this to calculate related probabilities</p> <p>Use the addition law for mutually exclusive events</p> <p>Use $p(A) + p(\text{not } A) = 1$</p> <p>Use simple set notation to describe simple sets of numbers or objects</p> <p><u>Use set notation to describe a set of numbers or objects e.g. $D = \{x : x \text{ is factor of } 280\}$</u></p> <p><u>Use frequency tree diagrams to enumerate sets and to record the probabilities of successive events (tree frames may be given and in some cases will be partly completed)</u></p>
	Y8	<p>Represent/interpret data in a two-way table (no probability)</p> <p>Construct a sample space diagram and use it to identify theoretical probabilities</p> <p>Construct a two-way table or Venn diagram and use it to identify theoretical probabilities</p>	<p>Generate theoretical sample spaces for single and combined events with equally likely, mutually exclusive outcomes and use these to calculate theoretical probabilities</p>		<p>Calculate probabilities of simple combined events, for example rolling two dice and looking at the totals</p> <p>Use tables and grids to list the outcomes of single events and simple combinations of events, and to calculate theoretical probabilities e.g. Flipping two coins, finding the number of orders in which the letters E, F and G can be written</p> <p><u>Use sample spaces for more complex combinations of events e.g. outcomes for sum of two dice</u></p>
	Y9	<p>REVISE identifying all the outcomes for an experiment or situation, using a lists and sample space diagrams</p> <p>REVISE working out theoretical probabilities for events with equally likely outcomes, and the 0-1 probability scale</p> <p>Extend using the fact that the sum of probabilities for all outcomes is 1 to simple algebraic problems</p> <p>Identify the relative frequency of an event from experimental data</p> <p>Understand that increasing the sample size leads to outcomes that are closer to theoretical probability, and that repeating an experiment may change the outcome</p> <p>Use theoretical or experimental probability to calculate expected outcomes</p>	<p>Record, describe and analyse the frequency of outcomes of simple probability experiments involving randomness, fairness, equally and unequally likely outcomes, using appropriate language and the 0-1 probability scale</p>	<p>Use a probability model to predict the outcomes of future experiments; understand that empirical unbiased samples tend towards theoretical probability distributions, with increasing sample size</p>	<p>Use relative frequency as an estimate of probability</p> <p>Calculate probabilities, expressed as fractions or decimals, in simple experiments with equally likely outcomes e.g. flipping coins, rolling dice</p> <p>Record, describe and analyse the relative frequency of outcomes of repeated experiments using tables and frequency trees</p> <p>Apply ideas of randomness and fairness in simple experiments</p> <p>Use probabilities to calculate the number of expected outcomes in repeated experiments</p> <p><u>Understand that relative frequencies approach the theoretical probability as the number of trials increases</u></p>
	Y10	<p>Know and apply the addition and multiplication laws of probability ('or' and 'and')</p> <p>Draw/label/use a probability tree diagram to solve a range of problems involving dependent and independent combined events</p>		<p>Calculate the probability of independent and dependent combined events, including using tree diagrams and other representations, and know the underlying assumptions</p>	<p><u>Use frequency tree diagrams and other representations to calculate the probability of independent and dependent combined events</u></p>
	Y11	<p>Construct a Venn diagram to solve a problem, including calculating probabilities</p> <p>Solve more complex problems using tree diagrams, including constructing diagrams on a blank page</p>			<p><u>Construct a Venn diagram to classify outcomes and calculate probabilities</u></p> <p><u>Derive or informally understand and apply the formula $p(A \text{ or } B) = p(A) + p(B) - p(A \text{ and } B)$</u></p>