Mathematics

Curriculum Overview

All children are entitled to a curriculum and to the powerful knowledge which will open doors and maximise their life chances. Below is a high-level overview of the critical knowledge children will learn in this particular subject, at each key stage from Reception through to Year 13, in order to equip students with the cultural capital they need to succeed in life. The curriculum is planned vertically and horizontally giving thought to the optimum knowledge sequence for building secure schema.

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

		Cycle 1	Cycle 2	Cycle 3
EYFS	**New Learning**	Early mathematical experiences: Classifying; matching; comparing; ordering. Pattern, shape and early number: Recognise, describe, copy patterns; 3-D shapes; position; count up to 6 objects reliably; one more/one less; concept of zero; addition and subtraction within 6. Measures, length and time: Capacity, size and length of everyday objects using everyday vocabulary; weeks, seasons, time; ordinal language	Numbers: Numbers up to 10: count, represent, recognise and order; addition and subtraction, augmentation and reduction. Numbers up to 15: explore, represent, count and order; grouping and sharing. Numbers within 20: investigate number combinations; ordinal numbers; double and half.	Shape and pattern: Describe / sort shapes; recognise, continue and create pattern. Addition and subtraction: Commutativity; comparing two amounts; doubling and halving. Money and measures: Compare / describe coins' capacities, volumes, weights and lengths. Number: Different representations; recognise and extend a pattern; recognise, compare and say numbers to 50.
Year 1 Manipulation and making links	**New Learning**	Number: Numbers up to 20: identifying, comparing, ordering, doubling, halving, addition, subtraction and number bonds. Shape and pattern: Common 2D and 3D shapes; positioning; instructional language.	Number: Telling the time; exploring calculation strategies within 20; numbers to 50; addition and subtraction within 20. Fractions and measures: Recognise and find a half, one quarter; compare lengths and masses; measure and record.	Number: Numbers 50 to 100 and beyond; counting in 1s / 5s / 10s; place value; add / subtract beyond 20; multiply and divide. Money and measures: Recognise value of coins and notes; add / subtract with money; compare, describe and measure capacity / volume.
	Review	Daily Maths Meeting recapping knowledge covered in previous units	Daily Maths Meeting recapping knowledge covered in previous units	Daily Maths Meeting recapping knowledge covered in previous units
Year 2 Manipulation and making links	**New Learning**	Number: Numbers within 100; add and subtract 2-digit numbers; addition and subtraction word problems; multiply and divide by 2 / 5/ 10. Measures and graphs:	Number: Time; simple fractions of objects; equivalent fractions; 2-digit calculation, including regrouping / adjusting; money. Geometry: Faces; shapes and patterns; lines;	Number: Numbers within 1000; exploring calculation strategies, including mental and formal written methods; multiply / divide by 3 / 4. Measures:

		Measuring length: cm, m; reading scales; tally charts; pictograms; tables; totalling.	turn; positional language.	Capacity and volume measures; appropriate measures for mass; Read scales up to 1000.
	Review	Daily Maths Meeting recapping knowledge covered in previous units	Daily Maths Meeting recapping knowledge covered in previous units	Daily Maths Meeting recapping knowledge covered in previous units
Year 3 Building independence and automony	New Learning	Number: Number sense and exploring calculation strategies; place value; rounding; addition; subtraction using various strategies. Measures and graphs: Interpret data from charts / tables; solve one-step and two-step problems; measure / compare / add / subtract lengths using appropriate units. / Length & perimeter / graphs	Number: Multiplication and division methods; problem solving; inverse; formal methods of multiply / divide. Time and fractions: Tell / record / write time in 12-hour using am / pm; use simple fractions; simple fraction calculation methods.	Shape and measure: Angles; parallel / perpendicular lines; draw and measure 2D shapes; measure using appropriate tools and units. Number: Securing multiplication and division for 6 and 8 times tables; mental addition / subtraction; numbers beyond 1000
	Review	Daily Maths Meeting recapping knowledge covered in previous units	Daily Maths Meeting recapping knowledge covered in previous units	Daily Maths Meeting recapping knowledge covered in previous units
Year 4 Building independence and autonomy	New Learning	Number: Reasoning with 4-digit numbers; rounding; addition / subtraction; multiplication / division methods. Data: Discrete and continuous data; interpret and present using graphical methods.	Number: Securing multiplication facts; equivalent fraction; add / subtract fractions to more than 1; decimals. Geometry: Time conversions; calculate perimeter and area of rectilinear shapes.	Problem solving: Solving problems involving measure and money; fractions and decimals. Geometry and pattern: Shape and symmetry; position and direction; reasoning with patterns and sequences; 3D shapes.
	Review	Daily Maths Meeting recapping knowledge covered in previous units	Daily Maths Meeting recapping knowledge covered in previous units	Daily Maths Meeting recapping knowledge covered in previous units
Year 5 Formalisation and consolidation	New Learning	Number: Reasoning with large whole numbers; integer addition and subtraction; factors; primes; squares; cubes.	FDP: Converting between fractions, decimals and percentages; four operations with fractions.	Number: Solving multi-step problems with whole numbers and decimals using all operations.
	New Learning	Graphs and geometry: Tables and line graphs; perimeter and area of non-rectilinear shapes.	Angles and transformations: Acute; obtuse; reflex, draw and measure angles; angle facts; translations; reflections.	Geometry: Unit conversion; regular and irregular polygons; nets of 3D shapes; circles; volume / capacity and cube numbers.
	Review	Daily Maths Meeting recapping knowledge covered in previous units	Daily Maths Meeting recapping knowledge covered in previous units	Daily Maths Meeting recapping knowledge covered in previous units
	Domain	Maths week involving various enrichment activities / tasks.		

Year 6 Formalisation and consolidation	**Application and extension of key skills**	Integers and decimals addition and subtraction; long multiplication and long division; calculation problems including algebraic solving.	Equivalence; simplification; comparing, ordering and calculation of fractions; ratio; percentages; statistics; missing angles and lengths; coordinates and shapes.	Conversions of metric measures; time; area; volume; FDP equivalence; statistical diagrams; averages; proportion problems.
	Review	Daily Maths Meeting recapping knowledge covered in previous units	Daily Maths Meeting recapping knowledge covered in previous units	Daily Maths Meeting recapping knowledge covered in previous units
	Domain	Maths week involving various enrichment activities / tasks.		
Year 7 Formalisation and consolidation	**New Learning**	BLOCK: ALGEBRAIC THINKING Sequences; understanding and using algebraic notation; equality and equivalence. BLOCK: PLACE VALUE AND PROPORTION Place value and ordering integers and decimals; fraction, decimal and percentage equivalence.	BLOCK: APPLICATIONS OF NUMBER Solving problems with addition and subtraction; solving problems with multiplication and division; fractions and percentages of amounts. BLOCK: DIRECTED NUMBER Four operations with directed number. BLOCK: FRACTIONAL THINKING Addition and subtraction of fractions.	BLOCK: REASONING WITH NUMBER Developing number sense (mental arithmetic and estimation); sets and probability; prime numbers and proof. BLOCK: LINES AND ANGLES Constructing, measuring and using geometric notation; developing geometric reasoning (angle calculations).
	Extension	Finding the nth term of a linear sequence; expanding and factorising single brackets. Extension, expanding double brackets for higher ability students. Upper and lower bounds.	Forming equations to solve perimeter and area problems. Perimeter calculations involving upper and lower bounds. Repeated percentage increase and decrease.	
	Review	Do Now activities and Period 1 Collective Learning retrieval activities recap material taught in the previous cycle. Interleaved curriculum frequently revisits learnt skills.	Do Now activities and Period 1 Collective Learning retrieval activities recap material taught in the previous cycle. Interleaved curriculum frequently revisits learnt skills.	Do Now activities and Period 1 Collective Learning retrieval activities recap material taught in the previous cycle. Interleaved curriculum frequently revisits learnt skills.
	CEAIG	Careers in finance (place value and applications of number – into Cycle 2). Careers in animation (sequences and pattern recognition).	Careers in construction and design (area and perimeter problems).	Functional skills as access to future career paths. Careers in construction and design. Careers in landscaping (angle appreciations).
Year 8 Formalisation and consolidation	**New Learning**	BLOCK: PROPORTIONAL REASONING Ratio and scale; multiplicative change (direct proportion, scale factors and currency conversions); multiplying and dividing fractions. BLOCK: REPRESENTATIONS Working in the Cartesian plane (straight line graphs); representing data (scatter graphs, understanding data sets; tables and probability.	BLOCK: ALGEBRAIC TECHNIQUES Brackets, equations and inequalities; sequences; indices. BLOCK: DEVELOPING NUMBER Fractions and percentages; standard index form; number sense (mental strategies, metric unit conversions, order of operations and estimation).	BLOCK: DEVELOPING GEOMETRY Angles in parallel lines and polygons; area of trapezia and circles; line symmetry and reflection. BLOCK: REASONING WITH DATA The data handling cycle; measures of location and averages.

	Extension	Inverse proportion and simple best buy calculations. Area and volume scale factors for higher ability students. Exploring perpendicular lines.	Rearranging algebra and changing the subject of formulae. Expanding triple brackets and factorising quadratic expressions for higher ability students. Compound and simple interest.	Introduction to carrying out translations and rotations. Pythagoras' theorem (derivation and application in 2D). Constructing and interpreting stem and leaf diagrams.
	Review	Do Now activities and Period 1 Collective Learning retrieval activities recap material taught in the previous cycle. Interleaved curriculum frequently revisits learnt skills.	Do Now activities and Period 1 Collective Learning retrieval activities recap material taught in the previous cycle. Interleaved curriculum frequently revisits learnt skills.	Do Now activities and Period 1 Collective Learning retrieval activities recap material taught in the previous cycle. Interleaved curriculum frequently revisits learnt skills.
	CEAIG	Careers in catering (proportional scaling). Careers in data analysis.	Careers in medicine and ecology (standard index form). Careers in construction and trades (metric unit conversions, estimation and mental arithmetic strategies).	Careers in data analysis (reasoning with data block of learning), inc. sports performance analysis.
Year 9 Application and extension	**New learning**	BLOCK: REASONING WITH ALGEBRA Straight line graphs; forming and solving equations; testing conjectures. BLOCK: CONSTRUCTING IN 2 AND 3 DIMENSIONS Three dimensional shapes (properties, volume and surface area); constructions and congruency.	BLOCK: REASONING WITH NUMBER Numbers (types of number, fraction arithmetic revisited and standard form); using percentages inc. multipliers; mathematics and money. BLOCK: REASONING WITH GEOMETRY Deduction (angle problems, inc. chains of reasoning to evaluate angles); rotation and translation; Pythagoras' theorem.	BLOCK: REASONING WITH PROPORTION Enlargement and similarity; solving ratio and proportion problems, inc. direct and inverse proportion graphs; rates (working with compound units). BLOCK: REPRESENTATIONS Solving problems using graphs, tables and algebra.
	Review	Do Now activities and Period 1 Collective Learning retrieval activities recap material taught in the previous cycle. Interleaved curriculum frequently revisits learnt skills.	Do Now activities and Period 1 Collective Learning retrieval activities recap material taught in the previous cycle. Interleaved curriculum frequently revisits learnt skills.	Do Now activities and Period 1 Collective Learning retrieval activities recap material taught in the previous cycle. Interleaved curriculum frequently revisits learnt skills.
	CEIAG	Careers in construction and design. Understanding of loci is present in careers linked to network coverage. Skills required for political careers are met in the formation of algebraic arguments.	Careers in surveyance and architecture. Careers in finance and banking (mathematics and money block of learning). Functional skill of logical reasoning and systematic thought processes (deduction block of learning).	Careers in design and manufacturing (scale drawings). Careers in sports analysis (compound units and speed calculations).
Year 10 Application and extension	**New learning**	BLOCK: SIMILARITY Congruency, similarity and enlargement; trigonometry. BLOCK: DEVELOPING ALGEBRA Representing solutions of equations and inequalities; simultaneous equations.	BLOCK: GEOMETRY Angles and bearings; working with circles (area, circumference and introduction to circle theorem); vectors (vector arithmetic and proofs involving vectors). BLOCK: PROPORTIONS AND PROPORTIONAL CHANGE	BLOCK: DELVING INTO DATA Collecting, representing and interpreting data. BLOCK: USING NUMBER Non-calculator methods; types of number and sequences; indices and roots, inc. surd calculations

Dixons Allerton Academy is part of the Dixons Academies Charitable Trust - A Company Limited by Guarantee

Registered Office: Dixons City Academy, Ripley Street, Bradford, West Yorkshire, BD5 7RR. Registered in England No: 2303464

			Ratios and fractions; percentages and interest; understand iterative processes; probability.	
	Review	Do Now activities and Period 1 Collective Learning retrieval activities recap material taught in the previous cycle. Interleaved curriculum frequently revisits learnt skills.	Do Now activities and Period 1 Collective Learning retrieval activities recap material taught in the previous cycle. Interleaved curriculum frequently revisits learnt skills.	Do Now activities and Period 1 Collective Learning retrieval activities recap material taught in the previous cycle. Interleaved curriculum frequently revisits learnt skills.
	CEAIG	Careers in surveyance, architecture and construction.	Careers in nautical navigation (bearings). Careers in the medical field (probability).	Careers in data analysis. Careers in business, economics and finance (collecting, representing and interpreting data).
Year 11 Application and extension	Application and extension of key skills	BLOCK: GRAPHS Gradients and lines; non-linear graphs; using graphs (reflecting shapes, real-life graphs). BLOCK: ALGEBRA Expanding and factorising; changing the subject; functions.	BLOCK: REASONING Multiplicative; geometric; algebraic. BLOCK: REVISION AND COMMUNICATION Transforming and constructing; listing and describing; proofs and show that style examination questions.	
Year 12 Formalisation, application and extension		PURE MATHS Algebra and functions: Algebraic expressions; quadratic functions – factorising, solving, graphs and the discriminants; equations – quadratic/linear simultaneous; Inequalities – linear and quadratic; graphs – cubic, quartic and reciprocal; transformations – transforming graphs Coordinate geometry in the (x, y) plane: Circles – equation of a circle, geometric problems on a grid Further algebra: Algebraic division, factor theorem and proof; the binomial expansion.	PURE MATHS Trigonometry: Trigonometric ratios and graphs; trigonometric identities and equation. Vectors (2D): Position vectors, distance between two points, geometric problems. Differentiation: Gradients, tangents, normals, maxima and minima. Integration: Definite integrals and areas under curves. Exponentials and logarithms: Exponential functions and natural logarithms.	STATISTICS AND MECHANICS Section A – Statistics Statistical sampling: Compare sampling techniques in context. Data presentation and interpretation: Calculation and interpretation of measures of location; understand and use coding. Probability: Mutually exclusive and independent events. Statistical distributions: Calculate probabilities using the binomial distribution (calculator use expected). Statistical hypothesis testing: Carry out hypothesis tests involving the binomial distribution. Section B – Mechanics Kinematics 1 (constant acceleration): Motion in a straight line under constant acceleration.

				Forces & Newton's laws: Newton's first law, force diagrams, equilibrium, introduction to i, j system Newton's second law, 'F = ma' Kinematics 2 (variable acceleration): Integration for kinematics problems.
Yeat 13 Formalisation, application and extension		PURE MATHS Proof: Examples including proof by deduction and proof by contradiction. Algebraic and partial fractions: Simplifying algebraic fractions; partial fractions. Functions and modelling: Modulus function; composite and inverse functions; transformations. Series and sequences: Arithmetic and geometric progressions (proofs of 'sum formulae'). The binomial theorem Trigonometry: Radians (exact values), arcs and sectors; small angles; secant, cosecant and cotangent; $R\cos(x \pm \alpha)$ or $R\sin(x \pm \alpha)$ Parametric equations: Definition and converting between parametric and Cartesian forms.	PURE MATHS Differentiation: Differentiating exponentials and logarithms; differentiating products, quotients, implicit and parametric functions; second derivatives; rates of change problems. Numerical methods: Location of roots; solving by iterative methods; Newton-Raphson method. Integration (part 1): Using the reverse of differentiation; using trigonometric identities to manipulate integrals. Integration (part 2): Integration by substitution; integration by parts; the trapezium rule. Vectors (3D): Use of vectors in three dimensions.	STATISTICS AND MECHANICS Section A - Statistics Regression and correlation: Statistical hypothesis testing for zero correlation. Probability: Conditional probability; questioning assumptions in probability. The Normal distribution: Statistical hypothesis testing for the mean of the Normal distribution. Section B – Mechanics Moments: Forces' turning effect. Forces at any angle: Friction forces (including coefficient of friction μ) Applications of kinematics: Projectiles Applications of forces: Equilibrium and statics of a particle; dynamics of a particle. Further kinematics: Constant acceleration; variable acceleration.

See link to GCSE Mathematics Specification:

https://qualifications.pearson.com/content/dam/pdf/GCSE/mathematics/2015/specification-and-sample-assesment/gcse-maths-2015-specification.pdf

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

Please refer to the DAT Curriculum Principles, published on our website, for further information about how we have designed our all-through curriculum.

Dixons Allerton Academy is part of the Dixons Academies Charitable Trust – A Company Limited by Guarantee

Registered Office: Dixons City Academy, Ripley Street, Bradford, West Yorkshire, BD5 7RR. Registered in England No: 2303464