KESTEVEN AND SLEAFORD HIGH SCHOOL

Mathematics Scheme of Learning

Year 9 – Term 1/Expanding&Factorising/Solving Equations/ Transformations/ Area&Perimeter

Intent – Rationale

Year 9 is the finale of KS3, where students must have secured knowledge up to Foundation GCSE to be prepared for Higher GCSE studies. Underpinning much of GCSE mathematics is algebraic methods so this begins term 1.

Sequencing – what prior learning does this topic build upon?	Sequencing – what subsequent learning does this topic feed into?
• Year 7 Term 1 symmetry, KS2 transformations, • Year 8 Term 1 expressions & identities • Year 8 Term 2 drawing quadratics • Year 8 Term 6 volume (HSL) • Year 9 Term 1 expanding & factorising • Year 9 Term 1 algebra	• Year 9 Term 1 solving equations, A&P substituting into formulae and algebraic problems • Year 9 Term 3 changing the subject • Year 9 Term 4 construction triangles • Year 9 Term 5 volume • GCSE transformations
What are the links with other subjects in the curriculum?	**What are the links to SMSC, British Values and Careers?**
Art • Transformation/tessellation of shapes (Escher) **Design and Technology** • Calculating areas and perimeters for design • Construction and transformations strands of shape, space and measures **Languages** • Solving worded problems • Evaluating the language used in questions **Science**	• SP2&3, C1 - The use of symbols to represent numbers, developing the understanding that a letter can represent any number. Draw students' attention to the roots of algebra in the Middle East and India. • SP2&3, C1 - An introduction to Pi as an infinite number, link to its use in astronomy. Discussion of the independent discovery of Pi by various cultures and the work carrying on today across the globe investigating this fascinating ratio. • GB4efghi

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• Indices • Use of known/given formulae	
What are the opportunities for developing literacy skills and developing learner confidence and enjoyment in reading?	**What are the opportunities for developing mathematical skills?**
• 'The Math Book' - Clifford Pickover	• Ensure a clear understanding of algebraic manipulation and understanding of command words such as solve, expand, simplify. • Development of spacial awareness, including reflecting and rotating objects.

Mathematics Scheme of Learning
Year 9 – Term 1

Intent – Concepts

What knowledge will students gain and what skills will they develop as a consequence of this topic?
National Curriculum reference Use and interpret algebraic notation, including: ab in place of a × b,3y in place of y + y+ y and 3 × y, a^2 in place of a × a, a^3 in place of a × a × a; a^2b in place of a × a × b $\frac{a}{b}$ in place of a ÷b Coefficients written as fractions rather than as decimals Brackets: simplify and manipulate algebraic expressions to maintain equivalence by: collecting like terms, multiplying a single term over a bracket, taking out common factors. Model situations or procedures by translating them into algebraic expression or formulae and by using graphs. Use algebraic methods to solve linear equations in one variable (including all forms that require rearrangement). Draw accurate reflections on squared paper and by using co-ordinates with or without tracing paper. Investigation of reflections within shapes, on isometric paper and repeated reflections. Rotate shapes through angles which are a multiple of 90°, be able to fully describe a rotation. Enlarge a shape by a scale factor with and without a centre of rotation including negative and fractional enlargements, be able to fully describe an enlargement.

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Derive and apply formulae to calculate and solve problems involving: perimeter and area of triangles, parallelograms, trapezia, calculate and solve problems involving: perimeters of 2-D shapes and composite shapes.

Know

Identify an expression, equation, formula and identity. Factorise by common factors in to a single bracket. Expand single and double brackets (using grid or FOIL). Factorise quadratic equations with coefficients of x^2.
Solve linear equations with brackets, fractions and unknowns on both sides.
Solve quadratic equations by factorising.
Describe and draw objects using the 4 transformations separately and combined.
Know and use the formulae for area and perimeter of simple shapes including circles.

Apply

Form and solve linear and quadratic equations from a worded problem.
Link quadratic solutions with graphical form.
Use algebraic methods to solve area and perimeter problems.
Area and perimeter problems in context.

Extend

Solve simple algebraic fraction equations.
Solve quadratic equations using other methods.
Draw enlargement with a negative scale factor. Describe reflections giving the equation of the mirror line (not x/y axis or y=x).
Compound algebraic shape problems.

What subject specific language will be used and developed in this topic?	What opportunities are available for assessing the progress of students?
• Expression, identity, equation, formula, formulae, term, coefficient, expand, solve, factorise, simplify, collect like terms, linear, quadratic • Rotate, reflect, enlarge, scale factor, vector, translate, centre of rotation, centre of enlargement, mirror line, rays, object, image, clockwise, anticlockwise • Area, perimeter, compound, simplest form	• Half term unit test • Mid Term marking targets • Mini whiteboards • Catchphrase

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Expanding and Factorising	R	A	G
Be able to factorise by common factors in to a single bracket			
Know how to expand single and double brackets			
Factorise quadratic expressions in to two brackets			

Equations	R	A	G
Know how to solve linear equations			
Know how solve quadratic equations by factorising			
Form and solve equations from a written problem			

Transformations	R	A	G
Draw and describe translations			
Draw and describe reflections			
Draw and describe rotations			
Draw and describe enlargements			

Area and Perimeter	R	A	G
Find the area and perimeter of simple shapes			
Find the area and perimeter of compound shapes			
Solve using algebraic methods area and perimeter problems			

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Intent – Concepts

Lesson title	Learning challenge	Higher level challenge	Suggested activities and resources
Expanding and Factorising	Be able to factorise by common factors in to a single bracket		Recap algebra manipulation basics: simplifying fish colouring Order of operations KMB Y9 Expanding and Factorising Notebook
	Know how to expand single (recap) and double brackets		Catchphrase double brackets 'Extension 9' Algebra A1.2
	Factorise quadratic expressions in to two brackets	Can students recognise how this leads to "quicker" factorisation of $1x^2$ expressions? 'Extension 9' Algebra A1.2	Start with a coefficient of x^2 using a x c to separate x term in to two terms, factorise pairs.
Solving Equations	Solving linear equations		Mini quiz for prior knowledge solving with fractions, brackets, unknowns both sides KMB Y9 Solving Equations Notebook
	Solving Quadratic equations	Solving using other methods e.g. quadratic formula, completing the square (inc with coefficients) 'Extension 9' Algebra A1.2	Emphasise set = 0 Refer back to Year 8 graphs as to why there are 2 solutions
	Forming and solving equations		Forming linear & quadratic 'Extension 9' Algebra A1.2
Transformations (taken from Y8 SOL due to school closures)	Translation – draw and describe		Y8 Transformations Notebook 'Extension 9' Geometry GM2.1
	Reflection – draw and describe	Describe mirror lines other than x/y axis and y=x	'Extension 9' Geometry GM2.1

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	Rotation		'Extension 9' Geometry GM2.1
	Enlargement Fractional scale factors	What do you think happens if the SF is negative? 'Extension 9' Geometry GM2.2	Ensure students are aware enlargement can make an object bigger or smaller. 'The National Curriculum…and beyond' pg195 and pg200-201 'Extension 9' Geometry GM2.2
	Combined Transformations		
Area & Perimeter	Recap area of simple shapes (including circles) Area and Perimeter of compound shapes	'The National Curriculum…and beyond' pg90 'Extension 9' Geometry GM1.3 'Problem Solved! Book 3' Chapter 7	Y9 Area and Perimeter Notebook 'The National Curriculum…and beyond' Area, Volume and Formulae chapter 'Extension 9' Geometry GM1.2
	Working backwards when area or perimeter is known.	'The two shapes have the same area, what is the missing length of shape b?' 'Problem Solved! Book 3' Chapter 7	Area&P missing lengths 'The National Curriculum…and beyond' Area, Volume and Formulae chapter
	Solving algebraic problems	Compound area problems	Goalless problems to increase confidence Describing area A&P algebraic problems