KESTEVEN AND SLEAFORD HIGH SCHOOL

Mathematics Scheme of Learning

Year 8–Term 1 Number properties/Construction/Graphs and Inequalities /Expressions&Identities/Area&Perimeter

Intent – Rationale

Year 8 begins ensuring students have a secure understanding of number properties to use throughout topics. Their algebra knowledge is developed from Yr7 basics to ensure accurate language and notation is understood. This knowledge is then used in Area and Perimeter problems once they have recapped formula for basic shapes and introduced new formula.

Sequencing – what prior learning does this topic build upon?	Sequencing – what subsequent learning does this topic feed into?
• Year 7 Term 1 area & perimeter of quadrilaterals • Year 7 Term 2 number properties • Year 7 Term 2 algebra basics • Year 7 Term 3 circles • Year 7 Term 4 straight line graphs • Year 7 Term 6 constructions	• Year 8 Term 1 area & Perimeter algebraic problems • Year 8 Term 2 straight line graphs • Year 8 Term 4 solving linear equations • Year 8 Term 4 construction including Loci • Year 8 Term 5 ratio • Year 9 Term 1 area and perimeter • Year 9 Term 1 factorising expressions • Year 9 Term 1 algebraic expressions • Year 9 Term 4 number properties • Year 9 Term 4 constructions • Year 9 Term 5 Inequalities • Year 9 Term 5 volume
What are the links with other subjects in the curriculum?	**What are the links to SMSC, British Values and Careers?**

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Design and Technology • Calculating areas and perimeters for design • Plot, draw and interpret appropriate graphs **Languages** • Solving worded problems • Evaluating the language used in questions **Science** • Indices • Use of known/given formulae **Geography** • Use and understand gradients	• 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 - Study of prime numbers as the building block of mathematics can lead to a discussion of the 'mystical' nature of these numbers. Bring in different mathematicians and their careers in time with history. • 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
What are the opportunities for developing literacy skills and developing learner confidence and enjoyment in reading?	**What are the opportunities for developing mathematical skills?**
• 'Blockhead: The life of Fibonacci' – Joseph D'agnese • 'The Math Book' - Clifford Pickover • 'Alex's Adventure in Numberland' - Alex Bellows • 'Infinity and me' – Kate Hosford	• Typically, students forget to half their initial answer when finding the area of a triangle, forget to use the perpendicular heights of a parallelogram/triangle and confuse values of "a and b" for parallelograms • Confusion with a x a = a^2 with a+a = 2a

Mathematics Scheme of Learning
Year 8 – Term 1

Intent – Concepts

What knowledge will students gain and what skills will they develop as a consequence of this topic?

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Know

Know first 15 square numbers and roots. Know the first 5 cube numbers and roots. Definition of a prime number. Find the LCM and HCF using lists and prime factorisation, and find HCF and LCM through either pairs or Venn diagram method.

Construct an equilateral triangle and isosceles triangle. Construct a triangle given an angle and two side lengths.

Draw a straight-line graph and a non-linear graph using a table of values. Know how to draw a graph of the form x + y = c, using when x = 0 and y=0.

Simplify expressions using index laws and collecting like terms. Expand single brackets with numerical coefficients or letter. Able to differentiate between an identify, expression, equation or formula. Substitute in to an expression and formula-positive and negative values?

Recap calculating the area of rectangles, triangles, and compound shapes. Use the formula for the area of a parallelogram and trapezium.

Apply

Worded problems using LCM and HCF e.g. how many burgers can be made from x buns and y burgers?

Construct compound triangles to form an image

Identify the y intercept from a graph and an equation of the form y = mx + c

Form expressions and equations in simplest form

Substitute in to formula or expressions with context-positive and negative values, decimals and fractions

Algebraic representations of perimeter and area (one variable)

Extend

Worded LCM HCF problems

Coefficients and multiple variables used in multiply and divide problems

Expanding brackets with letter and number coefficients

Students begin to recognise the gradient from an equation

Finding side lengths when given the area

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<tr><th>What subject specific language will be used and developed in this topic?</th><th>What opportunities are available for assessing the progress of students?</th></tr>
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- Multiply, divide, integer, prime, index, indices, powers, cube, square, root, LCM, HCF, factorise/factorisation, Venn, simplify
- Compass, construct, protractor, scale drawing, accurately, equilateral
- Linear equation, y-intercept
- Expression, identity, equation, ‘like terms’, coefficient, substitute, formula, simplest/simplify, variable, expand

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- Quick Fire quizzes on squares/roots/cubes/cube roots
- Use of mini whiteboards for forming algebraic expressions
- Mid-term target questions
- End of half term assessment

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• Compound, rectangle, triangle, parallelogram, trapezium, parallel, quadrilateral, area, perimeter	

Number Properties	R	A	G
Know Prime numbers, square numbers, square roots and cube roots			
Find factors and multiples			
Solve worded problems finding LCM or HCF			
Prime factor decomposition and use to find HCF LCM			

Construction	R	A	G
Construct a circle of given radius/diameter			
Construct an equilateral triangle			
Construct an isosceles triangle			
Construct a triangle given an angle and two side lengths			

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Graphs & Equations	R	A	G
Recall: Drawing a straight-line graph using a table of values			
Draw the graph for an equation of the form x + y = c			
Identify the y intercept			
Draw a graph for a non-linear equation			

Expressions and Substitution	R	A	G
Able to simplify expressions			
Expand expressions with a single bracket			
Identify an expression, equation, formula			
Form an expression and equation			
Substitute in to an expression and formula			

Area and perimeter	R	A	G
Calculating the area of quadrilaterals, triangles, circles and compound shapes			
Calculating the area of a parallelogram and trapezium			
Mixed problems including algebraic representation			
Finding side lengths of given areas			

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Intent – Concepts

Lesson title	Learning challenge	Higher level challenge	Suggested activities and resources
Number Properties	Know first 15 square numbers and roots. Know the first 5 cube numbers and roots. Definition of a prime number; has **exactly 2 factors** itself and 1, hence 1 cannot be prime with only 1 factor.	Know square numbers for 16-20 'Problem Solved! Book 2' – Power Patterns pg23	Games T:\Departments\Curriculum\Maths\2019-20\KS3\Year 8 resources\Term 1 resources\factors, multiples grid sort.docx Y8 Number Properties notebook 'Extension 8' Number N1.2 Square roots and cube roots covered via remote learning in Y7.
	Factors and Multiples – know the difference	Worded problems	Mixed problems rather than exclusive practice 'Extension 8' Number N1.3
	Prime Factorisation – use pairs or Venn diagram method to find HCF and LCM	3 – loop Venn diagram HCF and LCM	GAW's 'Indian Method' 'Extension 8' Number N1.3
Constructions (Taken from Y7 SOL due to school closures)	Construct a circle of given radius/diameter Construct an equilateral triangle		Y7 Construction notebook when in school 'Extension 8' Geometry and Measures GM4.2
	Construct an isosceles triangle Construct a triangle given an angle and two side lengths	Compound triangle drawings	'Extension 8' Geometry and Measures GM4.2 Create a geometrical picture
Graphs and Equations	Recall: Drawing a straight- line graph using a table of values		Y8 Graphs and Equations

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(Taken from Y7 SOL due to school closures)	Draw the graph for an equation of the form x + y = c		(0,y) (x,0)
	Identify the y intercept	Connect equation with y values in table, can they spot m in y=mx+c?	Relate to (0,y) plotted last lesson, compare with y=mx+c equations, can students spot any connection? 'Extension 8' Algebra A3.3
	Draw a graph for a non-linear equation using table of values	What happens when plot y=1/x for x values -10 to 10?	
Expressions and Identities	Simplify expressions using index laws and collecting like terms	Include different powers	Y8 Expressions and Identities notebook when in school 'Extension 8' Algebra A2.1 and A4.1 Multiplying/Dividing powers covered via remote learning in Y7
	Expand expressions with a single bracket – introduce an identity here	Include number and letter coefficients Expand with decimals and fractions	'The National Curriculum…and beyond' Skills in Algebra Chapter 'Extension 8' Algebra A2.1 and A4.1
	Identify an expression, equation, formula, identity		Typically, a multiple choice or match up activity in exam – use 'The National Curriculum…and beyond' Skills in Algebra Chapter 'Extension 8' Algebra A2.1 and A4.1
	Form an expression and equation	'The National Curriculum…and beyond' The Mega Challenge Crossword pg310	Starter: I am thinking of a number Sentence translator 'The National Curriculum…and beyond' Skills in Algebra Chapter 'Extension 8' Algebra A2.1 and A4.1

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		'Problem Solved! Book 2' – Expressions and equations problem bank pg26	
	Substitute in to a formula and expression	Decimal and fraction substitution 'The National Curriculum…and beyond' Equations with Fractions pg302	'The National Curriculum…and beyond' Skills in Algebra Chapter 'Extension 8' Algebra A2.1 and A4.1
Area and Perimeter	Calculating the area of rectangles, triangles, and compound shapes	Design own compound shapes Use of decimals and fractions	Y8 Area and Perimeter notebook 'Extension 8' Geometry GM2.1
	Calculating the area of a parallelogram and trapezium	Use of decimals and fractions Trapezium formula investigation	Derive the formulae 'Extension 8' Geometry GM2.1
	Mixed problems including algebraic representation (relating back to Expressions and identities topic)	Compound shapes with algebraic representation	'Extension 8' Algebra A4.1
	Finding side lengths of given areas	'Problem Solved! Book 2' Chapter 7	